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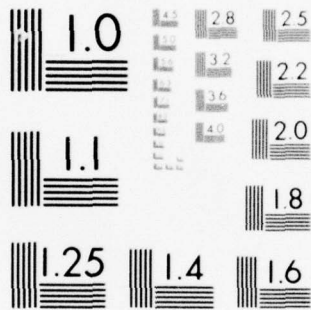
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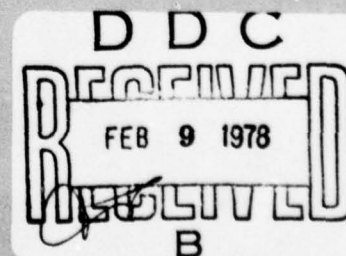


COMMUNICATIONS HIGH-ORDER LANGUAGE INVESTIGATION

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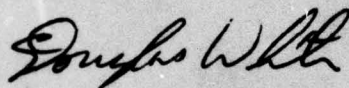
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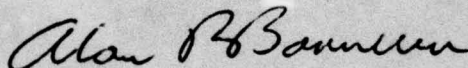
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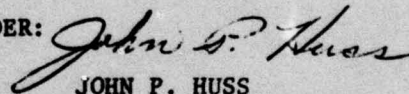
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
Programming Language, High Order Language, High Level Language, Communications, Requirements, Evaluation.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)		
This report contains data and conclusions that were used in selecting JOVIAL J73I as a base language for modifications that would result in a language suitable for programming communications applications. Volume I of this report contains a description of the process used to develop hypotheses on what features are required of a language suitable for programming communications applications. This volume also contains rationale for selection of JOVIAL/ J73I, efficiency requirements and results of a questionnaire concerning high-		

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order languages and communications.

Volume II of this report contains an extensive features list showing the presence or absence of specific features from each of the languages evaluated.

CS4, JOVIAL (both J3 and J73), PASCAL and PL/I.

1473B

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Appendix C

Language Features List

This appendix contains the language features list and language ratings. The features list is a revised and expanded version of the features list in [1]. The ratings are new. In general, each feature has a rating for each language.

The features are organized as follows:

- 1 Declarations and Storage Management
- 1 Data Types and Operations (Scalar)
 - 2 Integer Data Type
 - 2 Real Data Type
 - 2 Status Data Type
 - 2 Bit Data Type
 - 2 Boolean Data Type
 - 2 Character String Data Type
 - 2 Pointer Data Type
 - 2 Label Data Type
 - 2 Procedure Data Type
- 1 Aggregate Data Types
 - 2 Set Data Type
 - 2 File Data Type
 - 2 Array Data Type
 - 2 Structure Data Type
 - 2 Union Data Type (or Overlays)
- 1 Control Structures
- 1 Program Development Aids (and Miscellaneous)

Each feature is preceded by two numbers. The first is the feature number. The second is a hierarchical level number. The feature text is also indented according to its hierarchical level.

Each feature is followed by its language ratings, listed in the following order:

CHOL	the ideal Communications HOL criterion [2]
IRONMAN	the DoD IRONMAN criterion [3]
J73C	the new JOVIAL J73/C criterion/language
J73I	the JOVIAL J73/I language [4]
PASCAL	the PASCAL language [5]
PLI	the Multics PL/I language [6]
CS4	the CS-4 language [7]
J3	the standard JOVIAL J3 language [8]

A rating for a particular language consists of a single symbol, followed by an optional list of section references (to the appropriate language

Appendix C

manual), followed by an optional comment enclosed in parentheses. The references indicate which sections were used to determine the rating. A reference, such as 5.2, includes all subordinate sections, such as 5.2.1, if the rating can't be determined from just the text after 5.2 and prior to 5.2.1. The comments allow the ratings to be qualified so as to provide for unusual circumstances. (Note: for PASCAL, numeric references are to the revised report; alphanumeric references or references beginning with U are to the user manual.)

The rating symbols and their meanings are listed below:

- + the language has the feature
- the language does not have the feature
- n the feature does not apply
- ? can not determine from the manual whether or not the language has the feature
- o used for criteria, means don't care
- . same as o, but blocks the inheritance of ratings
- space no rating, but references and/or comment exist

An n rating usually means a higher level feature is rated - or the feature depends on the relationship between two other features and the language doesn't have both of them.

Not every feature has ratings. In particular, higher level features ending with ... often have no ratings since the feature is merely a prefixing phrase for the subordinate features. Also, if a language does not have a particular data type (e.g., PASCAL has no bit type), then the major section for that type (e.g., 2 Bit Data Type) will have no ratings for that language other than a - for the level 2 feature. The subordinate features are assumed to be rated n.

For the criteria (i.e., CHOL, IRONMAN, J73/C), the listing program has supplied a default rating of o for features with no rating for the particular criterion. In addition, the references and comment of the immediately higher level rating are inherited and enclosed in square brackets when a default o rating is supplied.

For the criteria (i.e., CHOL, IRONMAN, J73/C), the listing program performs the following changes to the rating symbols (after default o ratings are supplied):

if <u>parent</u> and <u>son</u> then new <u>son</u>
? o ?
-,n -,n,o n

If a rating symbol has been altered by this process, it is followed by an asterisk in the listing.

Appendix C

For J73/C, many of the ratings contain the comments "if RESTRICTED" or "unless RESTRICTED". J73/C programs may be compiled with or without a RESTRICTED option. If the restrictions are enabled, then certain language features, such as implicit type conversions, are not allowed (i.e., result in error messages). Thus, a feature rating of "+ (unless RESTRICTED)" means that J73/C has the feature when not restricted and does not have the feature when restricted.

References

- [1] Goodenough, John B., and Shafer, Lawrence H., A Study of High Level Language Features. Research and Development Technical Report ECOM-75-0373-F, vols. 1 and 2, U. S. Army Electronics Command, Fort Monmouth, New Jersey, February, 1976.
- [2] Hypotheses on Communications HOL Requirements: Working Paper. SofTech, Inc., 3061-2.1, Waltham, Mass., November, 1976.
- [3] Department of Defense Requirements for High Order Computer Programming Languages ("IRONMAN"), No. 7109, January, 1977.
- [4] JOVIAL J73/I Specification. Rome Air Development Center, Air Force Systems Command, Griffiss Air Force Base, New York, July, 1976.
- [5] Jensen, Kathleen, and Wirth, Niklaus, PASCAL User Manual and Report. Lecture Notes in Computer Science, vol. 18, Springer-Verlag, New York, 1974.
- [6] PL/I Language Manual. Honeywell Information Systems Inc., Order no. AG94 rev. 1, January, 1974.
- [7] Brosgol, B. M., Dreisbach, T. A., Felty, J. L., Lexier, J. R., Palter, G. M., Grimes, D. E., Nestor, J. R., CS-4 Language Reference Manual and Operating System Interface. Intermetrics Inc., Cambridge, Mass., October, 1975.
- [8] Standard Computer Programming Language for Air Force Command and Control Systems (CED 2400). Department of the Air Force, AFM 100-24, June, 1967.

Declarations and Storage Management

1 1 Declarations and Storage Management

CHOL	o
IRONMAN	o
J73C	o

2 2 implicit declarations

CHOL	- 1.3
IRONMAN	- 5B
J73C	- 1.3
J73I	- 1.3
PASCAL	- 2, 4, 10, 11
PLI	+ 5.2.6
CS4	-
J3	+ 2461

3 3 choice of properties depends on initial letter of identifier

CHOL	n * [1.3]
IRONMAN	n * [5B]
J73C	n
J73I	n
PASCAL	n
PLI	+ 5.3.1
CS4	n
J3	-

4 3 choices/defaults are programmer specifiable

CHOL	n * [1.3]
IRONMAN	n * [5B]
J73C	n
J73I	n
PASCAL	n
PLI	+ 5.3.1
CS4	n
J3	+ 2488, 2461

5 2 contextual declaration

CHOL	-
IRONMAN	o
J73C	-
J73I	- 1.3
PASCAL	- 2, 4, 10, 11
PLI	+ 5.2.4, 5.2.5
CS4	-
J3	-

Declarations and Storage Management

6 3 assumed for otherwise undeclared identifiers

CHOL	n * 1.3
IRONMAN	- 5A, 5B (type of constant identifier not determined by initialization value)
J73C	n * 1.3
J73I	-
PASCAL	-
PLI	+ 5.2.4, 5.2.5
CS4	-
J3	-

7 3 for local loop control variables

CHOL	n *
IRONMAN	o 6F, (5A)
J73C	n *
J73I	- 3.9
PASCAL	- 9.2.3.3, 4.C.3
PLI	- 12.9
CS4	- 4.7
J3	+ 2455

8 3 for label constants

CHOL	+
IRONMAN	o 6G
J73C	+
J73I	+ 2.3.2
PASCAL	- 10
PLI	+ 5.2.3.2.2
CS4	+
J3	+ 2459

9 2 explicit declarations

CHOL	+ 1.3
IRONMAN	+ 5B
J73C	+ 1.3
J73I	+ 2
PASCAL	+ 5, 7, 10, 11
PLI	+ 5.2.3
CS4	+ 2.2, 2.3
J3	+ 2462

Declarations and Storage Management

10 3 always required (except, perhaps, for loop variables and labels)

CHOL	+ 1.3
IRONMAN	+ 5A, 5B, 6G
J73C	+ 1.3
J73I	+ 1.3
PASCAL	+ 2, 4, 10, 11
PLI	- 5.2.4, 5.2.6
CS4	+
J3	- 2461

11 3 required for loop control variables

CHOL	o
IRONMAN	o 6E, 5B
J73C	+
J73I	+ 1.3, 3.9
PASCAL	+ 9.2.3.3
PLI	-
CS4	+ 4.7
J3	- 2455-2458

12 3 for labels...

CHOL	o
IRONMAN	. 6G, 5B
J73C	+
J73I	+ 2.3

13 4 required

CHOL	o
IRONMAN	o [6G, 5B]
J73C	-
J73I	+ 2.3.2 (only if name is declared in an enclosing scope)
PASCAL	+ 10
PLI	-
CS4	-
J3	- 2459

14 4 permitted

CHOL	o
IRONMAN	o [6G, 5B]
J73C	+
J73I	+ 2.3.2
PASCAL	-
PLI	+ 5.2.3.2.2
CS4	-
J3	- 2459

Declarations and Storage Management

15 3 factoring...

CHOL	o [1.3]
IRONMAN	o [5B]
J73C	o [1.3]
J3	-

16 4 for identifiers

CHOL	o
IRONMAN	o [5B]
J73C	-
J73I	- 2.1.4
PASCAL	+ 7 (variable declarations only)
PLI	+ 5.2.1.1
CS4	+ 2.3
J3	- 2464.1

17 5 for array bounds

CHOL	- 1.3
IRONMAN	o [5B]
J73C	n * 1.3
J73I	- 2.1.5.6
PASCAL	-
PLI	+ 5.2.1.1
CS4	-
J3	- 2468.1

18 4 for any property

CHOL	- 1.3
IRONMAN	o [5B]
J73C	- 1.3
J73I	- 2
PASCAL	- 6
PLI	+ 5.2.1.1
CS4	- 2.3
J3	- 2463, 2464.1

19 4 implies storage allocation layout

CHOL	- 1.2.6
IRONMAN	o [5B]
J73C	- 1.2.6
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	- 2465.5

Declarations and Storage Management

20 2 abbreviate declarations with...

CHOL	o
IRONMAN	o
J73C	o
PASCAL	-
CS4	-

21 3 language defined defaults

CHOL	o
IRONMAN	+ 1C
J73C	+
J73I	+ 2.1.3, 2.1.5
PASCAL	-
PLI	+ 5.3.3, 5.3
CS4	- 2.3.3 (except AUTO storage class is default)
J3	+ 2463, 2473.6, 2475.1, 2476

22 3 programmer-defined defaults

CHOL	- 1.3
IRONMAN	- 1C
J73C	- 1.3
J73I	-
PASCAL	-
PLI	+ 5.3.1, 5.3.2
CS4	-
J3	-

23 3 implementation-defined defaults

CHOL	-
IRONMAN	- 1C
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

24 2 abbreviate declarations using textual substitutions

CHOL	+
IRONMAN	o
J73C	+
J73I	+
PASCAL	-
PLI	+
CS4	-
J3	+

Declarations and Storage Management

25 3 local macros

CHOL	+	(restricted to use in declarations)
IRONMAN	+	5G
J73C	+	
J73I	+	2.5
PASCAL	-	
PLI	-	
CS4	-	
J3	+	2421

26 3 external macros

CHOL	+	
IRONMAN	+	5G, 12A
J73C	+	
J73I	+	2.5, 2.6.3, 2.6.4
PASCAL	-	
PLI	-	
CS4	-	
J3	-	2460

27 3 LIKE

CHOL	-	
IRONMAN	-	5G
J73C	-	
J73I	-	
PASCAL	-	
PLI	+	5.2.2
CS4	-	
J3	+	2476

28 2 abbreviate declarations using programmer-defined type names

CHOL	+	
IRONMAN	+	3-5A, 12D
J73C	+	
J73I	-	
PASCAL	+	6
PLI	-	
CS4	+	6
J3	-	

29 2 order of declaration's components...

CHOL	o
IRONMAN	o
J73C	o

Declarations and Storage Management

30 3 is fixed

CHOL	o
IRONMAN	o
J73C	+ (partly)
J73I	+ 2.1.3, 2.1.4, 2.1.5
PASCAL	+ 6, 7
PLI	-
CS4	+ (partly)
J3	+ 2463-64, 2468, 2472-73, 2475-2476

31 3 variation is permitted

CHOL	o
IRONMAN	o
J73C	+ (partly)
J73I	+ 1.5, 2.1.6 (overlays, block data)
PASCAL	-
PLI	+ 5.2.1
CS4	+ (partly, especially keyword parameters)
J3	+ 2465, 2474 (overlays)

32 2 position of declarations...

CHOL	o
IRONMAN	o
J73C	o

33 3 is restricted (declarations are grouped)

CHOL	+
IRONMAN	o
J73C	+ (if RESTRICTED)
J73I	-
PASCAL	+ 10
PLI	-
CS4	+ 2.1
J3	-

34 3 unrestricted (declarations/statements intermixed)

CHOL	-
IRONMAN	o
J73C	+ (unless RESTRICTED)
J73I	+ 1.6.2, 2.2
PASCAL	-
PLI	+ 2.2, 2.5
CS4	-
J3	+ 2450.1

Declarations and Storage Management

35 3 declaration before use is required

CHOL	+
IRONMAN	o
J73C	+ (if RESTRICTED)
J73I	? 1.3.3, 2.2.3
PASCAL	- (but is usually the case)
PLI	-
CS4	+ 2.2
J3	+ 2489.14

36 3 different kinds of declarations must be in a specific order

CHOL	-
IRONMAN	o
J73C	-
J73I	-
PASCAL	+ 10
PLI	-
CS4	-
J3	-

37 3 expressions in a declaration may use identifiers declared in...

CHOL	o
IRONMAN	o
J73C	o
J73I	- 2.1.4, 2.1.5, 2.1.7
J3	- 2464, 2468, 2473, 2475, 2489.14

38 4 outer blocks, procedures, etc.

CHOL	+
IRONMAN	o
J73C	+
J73I	n
PASCAL	+ 2, 10
PLI	+ 4.3.2.2
CS4	+ 4.3, 5.1
J3	n

39 4 lexically preceding declarations in the immediate block/procedure

CHOL	+
IRONMAN	o
J73C	+
J73I	n
PASCAL	+ 2, 10
PLI	- 4.3.2.2
CS4	+ 2.2, 2.3, 2.3.3
J3	n

Declarations and Storage Management

40 4 the current declaration

CHOL	-
IRONMAN	o
J73C	-
J73I	n
PASCAL	? 2, 10 (+ for type definitions, probably - for all else)
PLI	- 4.3.2.2
CS4	+ 2.2, 2.3, 2.3.3
J3	n

41 4 lexically following declarations in the immediate block/procedure

CHOL	-
IRONMAN	o
J73C	-
J73I	n
PASCAL	- 2, 10 (except type definitions)
PLI	- 4.3.2.2
CS4	- 2.2
J3	n

42 3 evaluation order of declarations is same as lexical order

CHOL	+
IRONMAN	o
J73C	+
J73I	? (makes no difference)
PASCAL	+ 2, 10 (probably)
PLI	-
CS4	+ 2.3.3
J3	? (makes no difference)

43 2 types of variables are...

CHOL	o
IRONMAN	o
J73C	o

44 3 static

CHOL	+
IRONMAN	+ 3A
J73C	+
J73I	+ 2.1
PASCAL	+ 2, 7
PLI	+ 4.1.3
CS4	+ 2.3, 2.3.1
J3	+ 2462

Declarations and Storage Management

45 3 dynamic

CHOL	-
IRONMAN	- 3A
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

46 2 name scoping/scope of a definition's validity

CHOL	o
IRONMAN	o
J73C	o

47 3 simple statement

CHOL	-
IRONMAN	o 5C
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

48 3 statement groups (other than subroutines)

CHOL	-
IRONMAN	o 5C
J73C	-
J73I	-
PASCAL	-
PLI	+ 5.1, 2.2
CS4	+ 4.3
J3	-

49 4 not nested

CHOL	n *
IRONMAN	o 5C
J73C	n *
J73I	-
PASCAL	n
PLI	+ 5.1
CS4	+ 4.3
J3	n

Declarations and Storage Management

50	4	nested/override permitted	
		CHOL	n *
		IRONMAN	o 5C (not clear that blocks are permitted)
		J73C	n *
		J73I	-
		PASCAL	n
		PLI	+ 5.1
		CS4	+ 4.3
		J3	n
51	4	nested/no override	
		CHOL	n *
		IRONMAN	- 5C
		J73C	n *
		J73I	-
		PASCAL	n
		PLI	-
		CS4	-
		J3	n
52	3	subroutine bodies	
		CHOL	+
		IRONMAN	+ 5C
		J73C	+
		J73I	+
		PASCAL	+ 10, 2, 4
		PLI	+ 5.1, 2.2
		CS4	+
		J3	+
53	4	not nested	
		CHOL	+
		IRONMAN	+ 5C
		J73C	+
		J73I	+ 1.3.3
		PASCAL	+ 10, 2, 4
		PLI	+ 5.1
		CS4	+ 5.1
		J3	+ 2489
54	4	nested/override permitted (see free name analysis)	
		CHOL	-
		IRONMAN	+ 5C
		J73C	+ (unless RESTRICTED)
		J73I	+ 1.3.3
		PASCAL	+ 10, 2, 4
		PLI	+ 5.1
		CS4	+ 5.1
		J3	- 2484.9 (no procedure nesting)

Declarations and Storage Management

55 4 nesting within recursive subroutines is permitted

CHOL	-
IRONMAN	o 7B
J73C	+ (unless RESTRICTED)
J73I	+ 1.3.3, 2.2, 1.4
PASCAL	+ 10, 2, 4
PLI	+ 5.1
CS4	n (no recursive procedures)
J3	n (no recursive procedures)

56 3 use of a name outside its defining scope

CHOL	o
IRONMAN	.
J73C	o

57 4 may forbid name's use outside defining scope

CHOL	+
IRONMAN	+ 3-5B
J73C	+ (if RESTRICTED)
J73I	-
PASCAL	-
PLI	-
CS4	+ 6.1.2, 7.2.1, 7.3.1
J3	-

58 4 permit different degrees of read/write access

CHOL	+
IRONMAN	o 3-5B
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

59 2 free names...

CHOL	o
IRONMAN	o
J73C	+
J73I	+
PASCAL	+
PLI	+
CS4	+
J3	+

Declarations and Storage Management

- 60 3 used in blocks and bound to def. in enclosing block/procedure
- | | |
|---------|------------------------|
| CHOL | n (blocks not allowed) |
| IRONMAN | o |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | + 5.1, 3.3 |
| CS4 | + 4.3 |
| J3 | - |
-
- 61 4 use and def. of an auto. variable must be enclosed by same procedures
- | | |
|---------|----------------------------|
| CHOL | n * [(blocks not allowed)] |
| IRONMAN | o |
| J73C | n |
| J73I | n |
| PASCAL | - 10, 2, 4 |
| PLI | - 5.1 |
| CS4 | - 4.3 |
| J3 | n |
-
- 62 3 used in blocks and bound to def. in a specified environment
- | | |
|---------|------------------------|
| CHOL | n (blocks not allowed) |
| IRONMAN | o |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
-
- 63 3 used in subroutines
- | | |
|---------|---|
| CHOL | + |
| IRONMAN | o |
| J73C | + |
| J73I | + |
| PASCAL | + |
| PLI | + |
| CS4 | + |
| J3 | + |
-
- 64 4 static binding
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | + 5C, 7C, 12D |
| J73C | + |
| J73I | + 1.3.3 |
| PASCAL | + 2 |
| PLI | + 5.1, 3.3 |
| CS4 | + 4.3, 5.1, 2.4.1 |
| J3 | + 2459-62, 2489 |

Declarations and Storage Management

- 65 5 constant names, static variables, etc.
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | + 5C, 7C, 12D |
| J73C | + |
| J73I | + 1.3.3 |
| PASCAL | + 2 |
| PLI | + 5.1, 3.3 |
| CS4 | + 4.3, 5.1, 2.4.1 |
| J3 | + |
-
- 66 5 stack-allocated variables; parameters
- | | |
|---------|-------------------------------|
| CHOL | + |
| IRONMAN | + 5C, 7C, 12D |
| J73C | + |
| J73I | + 1.3.3 |
| PASCAL | + 2 |
| PLI | + 5.1, 3.3 |
| CS4 | + 4.3, 5.1, 2.4.1 |
| J3 | + 2484-85 (no AUTO variables) |
-
- 67 4 compile-time binding to external names (external context specified)
- | | |
|---------|------------------|
| CHOL | + |
| IRONMAN | + 12A, 12B |
| J73C | + |
| J73I | + (COMPOOL only) |
| PASCAL | - |
| PLI | - |
| CS4 | + |
| J3 | + |
-
- 68 5 binding context is named file of declarations
- | | |
|---------|----------------|
| CHOL | + |
| IRONMAN | + 12A, 1B |
| J73C | + |
| J73I | + 1.6.1, 2.6.3 |
| PASCAL | n |
| PLI | n |
| CS4 | - |
| J3 | + 2460 |
-
- 69 5 binding context is named module
- | | |
|---------|----------------|
| CHOL | - |
| IRONMAN | + 12A, 1B |
| J73C | - |
| J73I | - |
| PASCAL | n |
| PLI | n |
| CS4 | + 7.3.1, 7.2.1 |
| J3 | - |

Declarations and Storage Management

- 70 5 names to be bound are specified explicitly
- | | | |
|---------|---|-----------------------|
| CHOL | + | (except for subnames) |
| IRONMAN | + | 12B, 1B |
| J73C | + | (except for subnames) |
| J73I | + | 2.6.4 |
| PASCAL | n | |
| PLI | n | |
| CS4 | + | 7.3.1 (optional) |
| J3 | - | |
- 71 5 names to be bound are not specified explicitly
- | | | |
|---------|---|---------|
| CHOL | + | |
| IRONMAN | + | 12B, 1B |
| J73C | + | |
| J73I | + | 2.6.4 |
| PASCAL | n | |
| PLI | n | |
| CS4 | + | 7.3.1 |
| J3 | + | 2460 |
- 72 5 context name specified inside module
- | | | |
|---------|---|------------|
| CHOL | + | |
| IRONMAN | o | [12A, 12B] |
| J73C | - | |
| J73I | - | |
| PASCAL | n | |
| PLI | n | |
| CS4 | + | 7.3.1 |
| J3 | - | |
- 73 5 context name defined externally (outside module)
- | | | |
|---------|---|---------------------|
| CHOL | - | |
| IRONMAN | o | [12A, 12B] |
| J73C | + | |
| J73I | + | 2.6.4.2 |
| PASCAL | n | |
| PLI | n | |
| CS4 | - | |
| J3 | + | (not specified how) |
- 74 5 bind one free name to another
- | | | |
|---------|---|-------|
| CHOL | - | |
| IRONMAN | ? | 12D |
| J73C | - | |
| J73I | - | |
| PASCAL | n | |
| PLI | n | |
| CS4 | + | 7.3.1 |
| J3 | - | |

Declarations and Storage Management

75 5 binding contexts can be indirectly referenced

CHOL	o
IRONMAN	o [12A, 12B]
J73C	-
J73I	-
PASCAL	n
PLI	n
CS4	+ 7.3.1
J3	-

76 5 modules and declarations can be in same context file

CHOL	-
IRONMAN	+ 12A
J73C	-
J73I	- 2.6.3
PASCAL	n
PLI	n
CS4	+ 7.3.1
J3	- 2460.1

77 4 dynamically bound free names

CHOL	-
IRONMAN	- 5C
J73C	-
J73I	-
PASCAL	- 2, 10
PLI	-
CS4	-
J3	-

78 5 when routine is invoked-always

CHOL	n *
IRONMAN	n
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

79 5 in context of routine's use as a parameter

CHOL	n *
IRONMAN	n
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

Declarations and Storage Management

- 80 5 when routine is returned as function's value
- | | |
|---------|-----|
| CHOL | n * |
| IRONMAN | n |
| J73C | n * |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 81 5 explicit operator exists to bind names dynamically
- | | |
|---------|-----|
| CHOL | n * |
| IRONMAN | n |
| J73C | n * |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 82 5 no constraints on free variable bindings
- | | |
|---------|-----|
| CHOL | n * |
| IRONMAN | n |
| J73C | n * |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 83 4 explicit specification that names are external (no context specified)
- | | |
|---------|-------------------|
| CHOL | + (export clause) |
| IRONMAN | - 12B |
| J73C | + (export clause) |
| J73I | + 2.6.1, 2.6.2 |
| PASCAL | + 13, 13.A.2 |
| PLI | + 5.1.2, 5.4.19 |
| CS4 | - |
| J3 | - |
- 84 5 can specify attributes for external names
- | | |
|---------|--|
| CHOL | + |
| IRONMAN | n * [12B] |
| J73C | + |
| J73I | + 2.6.1, 2.6.2 |
| PASCAL | + 13, 13.A.2 (external procedures and files) |
| PLI | + 5.1.2, 5.4.19 |
| CS4 | n |
| J3 | n |

Declarations and Storage Management

85 6 well defined response if attributes don't match defining occurrence

CHOL	+
IRONMAN	n * [12B]
J73C	+ (if RESTRICTED)
J73I	-
PASCAL	-
PLI	-
CS4	n
J3	n

86 4 programmer control over static or dynamic binding

CHOL	-
IRONMAN	n 5C
J73C	-
J73I	-
PASCAL	- 2, 10
PLI	-
CS4	-
J3	-

87 2 static storage

CHOL	+
IRONMAN	+ 3-5C
J73C	+
J73I	+
PASCAL	+ 2, 13
PLI	+ 4.3.2.3, 5.4.49
CS4	+ 2.3.3
J3	+

88 3 local to blocks

CHOL	n (no blocks)
IRONMAN	- 3-5C
J73C	n (no blocks)
J73I	n
PASCAL	n
PLI	+ 4.3.2.3, 5.1
CS4	+ 2.3.3, 4.3
J3	n

89 3 local to subroutines

CHOL	+
IRONMAN	? 3-5C
J73C	+
J73I	+ 1.3.3, 1.4
PASCAL	- 10
PLI	+ 4.3.2.3, 5.1
CS4	+ 2.3.3, 5.1
J3	+ 2489

Declarations and Storage Management

90 3 local to compilation unit

CHOL +
IRONMAN + 3-5C
J73C +
J73I + 1.3.3, 1.4
PASCAL + 2, 13
PLI + 4.3.2.3, 5.1, 2.1 (i.e., an external procedure)
CS4 + 2.3.3, 2.1
J3 + 2489

91 3 external to compilation units

CHOL +
IRONMAN + 3-5C, 5E
J73C +
J73I + 1.1, 1.3.3, 1.4, 1.6, 2.6.3, 2.6.4
PASCAL -
PLI + 4.3.2.3, 5.1.2, 5.4.19 (external static)
CS4 + 7.3.1, 7.2.1
J3 + 2489, 2460

92 3 ability to overlay static storage

CHOL +
IRONMAN + 3-3G, 3-5C, 3-3H
J73C +
J73I +
PASCAL -
PLI +
CS4 +
J3 +

93 2 automatic storage

CHOL +
IRONMAN + 5E
J73C +
J73I +
PASCAL + 2, 10
PLI + 4.3.2.2, 5.4.3, 3.3
CS4 + 2.3.3
J3 -

94 3 run-time allocation

CHOL +
IRONMAN o [5E]
J73C +
J73I + 1.4
PASCAL + 10
PLI + 4.3.2.2
CS4 + 2.3.3
J3 n

Declarations and Storage Management

95 3 allocation as static storage permitted

CHOL	+
IRONMAN	o [5E]
J73C	+
J73I	+ 1.4
PASCAL	?
PLI	- 4.3.2.2
CS4	- (reentrant code required)
J3	n

96 3 automatic storage local to blocks

CHOL	n (no blocks)
IRONMAN	o [5E]
J73C	n (no blocks)
J73I	n
PASCAL	n
PLI	+ 4.3.2.2, 5.1
CS4	+ 2.3.3, 4.3
J3	n

97 4 allocation at block entry/exit

CHOL	n * [(no blocks)]
IRONMAN	o [5E]
J73C	n
J73I	n
PASCAL	n
PLI	+ 4.3.2.2
CS4	+ 2.3.3, 4.3
J3	n

98 4 allocation at procedure entry/exit

CHOL	n * [(no blocks)]
IRONMAN	o [5E]
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	?
J3	n

99 4 programmer may choose allocation at block or procedure entry/exit

CHOL	n * [(no blocks)]
IRONMAN	o [5E]
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	-
J3	n

Declarations and Storage Management

100 4 explicitly allocated dynamic storage (local generators)

CHOL	n * [(no blocks)]
IRONMAN	o [5E]
J73C	n
J73I	n
PASCAL	n
PLI	+ 5.4.2 (automatic areas)
CS4	-
J3	n

101 3 automatic storage local to subroutines

CHOL	+
IRONMAN	+ 7B
J73C	+
J73I	+ 1.3.3, 1.4
PASCAL	+ 2, 10
PLI	+ 4.3.2.2
CS4	+ 2.3.3, 5.1
J3	n

102 4 allocation at subsystem entry/exit

CHOL	-
IRONMAN	o [7B]
J73C	-
J73I	-
PASCAL	-
PLI	- 4.3.2.2
CS4	?
J3	n

103 3 automatic storage local to subsystems

CHOL	-
IRONMAN	o [5E]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	? 2.1
J3	n

104 3 ability to overlay automatic storage

CHOL	+
IRONMAN	+ 3-3G, 3-3H
J73C	+
J73I	+ 1.5, 1.4
PASCAL	-
PLI	+ 4.3.3
CS4	+ 8.1.1
J3	n

Declarations and Storage Management

105 2 programmer controlled stack storage

CHOL	-
IRONMAN	- 1A
J73C	-
J73I	-
PASCAL	-
PLI	+ 4.3.2.4
CS4	-
J3	-

106 2 heap storage

CHOL	+
IRONMAN	+ 3-3I
J73C	+
J73I	-
PASCAL	+ 2, 6.3, 10.1.2
PLI	+ 4.3.2.5, 4.3.2.1
CS4	-
J3	-

107 3 ALLOCATE object

CHOL	+
IRONMAN	+ 3-3I
J73C	+
J73I	-
PASCAL	+ 10.1.2
PLI	+ 12.1
CS4	-
J3	-

108 3 explicit deallocate operator

CHOL	+
IRONMAN	- 3-3J
J73C	+
J73I	-
PASCAL	+ 10.1.2
PLI	+ 12.13
CS4	-
J3	-

109 3 garbage collection

CHOL	-
IRONMAN	+ 3-3J
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

Declarations and Storage Management

110 3 query space remaining

CHOL	o
IRONMAN	+ 8E
J73C	o
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

111 3 storage pools

CHOL	+
IRONMAN	o [3-31]
J73C	+
J73I	-
PASCAL	-
PLI	+ 5.4.2, 4.3.2.5, 4.3.2.1 (areas)
CS4	-
J3	-

112 4 zoned storage

CHOL	+
IRONMAN	o [3-31]
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

113 4 zoned storage/programmer defined allocation operators

CHOL	+
IRONMAN	o [3-31]
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

114 4 ALLOCATE/FREE pools within pools

CHOL	+
IRONMAN	o [3-31]
J73C	+
J73I	-
PASCAL	-
PLI	+ 5.4.2
CS4	-
J3	-

Declarations and Storage Management

115 4 CLEAR zone operator

CHOL	o
IRONMAN	o [3-31]
J73C	o
J73I	-
PASCAL	-
PLI	+ 13.6.8
CS4	-
J3	-

116 4 restrict an object to a zone

CHOL	+
IRONMAN	o [3-31]
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

117 3 exceptions/no space available

CHOL	+
IRONMAN	o [3-31]
J73C	+
J73I	-
PASCAL	-
PLI	+ 10.4.1, 10.4.13
CS4	-
J3	-

118 3 programmer-defined exceptions

CHOL	+
IRONMAN	o [3-31]
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

119 2 initialization

CHOL	+
IRONMAN	+ 5E
J73C	+
J73I	+ 2.1.7
PASCAL	-
PLI	+ 4.3.2.1, 5.4.25
CS4	+ 2.3.2
J3	+

Declarations and Storage Management

120 3 programmer must specify

CHOL	+
IRONMAN	- 5E
J73C	+ (if RESTRICTED)
J73I	-
PASCAL	-
PLI	-
CS4	+ 2.3.2
J3	-

121 3 programmer may specify

CHOL	-
IRONMAN	+ 5E, 3-5C
J73C	+ (unless RESTRICTED)
J73I	+ 2.1.7
PASCAL	-
PLI	+ 5.4.25
CS4	-
J3	+ 2464, 2468, 2472

122 3 programmer can not specify

CHOL	-
IRONMAN	- 5E
J73C	-
J73I	-
PASCAL	+ 10, 7
PLI	-
CS4	-
J3	-

123 3 default...

CHOL	-
IRONMAN	- 5E
J73C	- (if RESTRICTED)
PASCAL	n

124 4 no initialization

CHOL	n *
IRONMAN	n *
J73C	+ (unless RESTRICTED)
J73I	+ 2.1.7
PASCAL	n
PLI	+ 4.3.2.1 (everything except areas)
CS4	+ 2.3.2
J3	+ 2464, 2468, 2472

Declarations and Storage Management

125 4 to null value

CHOL	n *
IRONMAN	n *
J73C	n *
J73I	-
PASCAL	n
PLI	+ 4.3.2.1 (areas only)
CS4	-
J3	-

126 4 to zero bits

CHOL	n *
IRONMAN	n *
J73C	n *
J73I	-
PASCAL	n
PLI	-
CS4	-
J3	-

127 4 to undefined value (for access error checking)

CHOL	n *
IRONMAN	n * 10B, 13D, 5E
J73C	n *
J73I	-
PASCAL	n
PLI	-
CS4	+ 2.3.2
J3	-

128 4 for static storage

CHOL	n *
IRONMAN	n *
J73C	+
J73I	+ 2.1.7.2
PASCAL	n
PLI	+ 4.3.2.1
CS4	+ 2.3.2, 2.3.3
J3	+

129 4 for automatic storage

CHOL	n *
IRONMAN	n *
J73C	+
J73I	+ 2.1.7.2
PASCAL	n
PLI	+ 4.3.2.1
CS4	+ 2.3.2, 2.3.3
J3	n

Declarations and Storage Management

```
130 4   for heap storage
        CHOL      n *
        IRONMAN   n *
        J73C      +
        J73I      n
        PASCAL    n
        PLI       + 4.3.2.1
        CS4       n
        J3        n

131 3   programmer-defined initialization...
        CHOL      +
        IRONMAN   + 5E, 3-5C
        J73C      +
        J73I      + 2.1.7.2
        PASCAL    + 5
        PLI       + 4.3.2.1, 5.4.25
        CS4       + 2.3.2
        J3        + 2464, 2468, 2472

132 4   for static storage
        CHOL      +
        IRONMAN   + 3-5C
        J73C      +
        J73I      + 2.1.7.2
        PASCAL    -
        PLI       + 4.3.2.1, 5.4.25
        CS4       + 2.3.2, 2.3.3
        J3        + 2464, 2468, 2472

133 4   for automatic storage
        CHOL      +
        IRONMAN   + 5E, 7B
        J73C      +
        J73I      - 2.1.7.2
        PASCAL    - 10
        PLI       + 4.3.2.1, 5.4.25
        CS4       + 2.3.2, 2.3.3
        J3        n

134 4   for heap storage
        CHOL      +
        IRONMAN   + 5E, 3-3I
        J73C      +
        J73I      n
        PASCAL    - 10.1.2
        PLI       + 4.3.2.1, 5.4.25
        CS4       n
        J3        n
```

Declarations and Storage Management

135 4 for read-only data

CHOL	+
IRONMAN	+ 5A
J73C	+
J73I	n
PASCAL	+ 5 (named constants)
PLI	n
CS4	+ 2.3.2, 2.3
J3	n

136 4 named constants and variables have (almost) same initialization syntax

CHOL	o
IRONMAN	- 5E
J73C	o
J73I	n
PASCAL	- 5, 7
PLI	n
CS4	+ 2.3
J3	n

137 3 for automatic or heap storage...

CHOL	+
IRONMAN	o [5E]
J73C	+
J73I	- 2.1.7.2 (no heap storage)
PASCAL	-
PLI	+ 4.3.2.1, 5.4.25, 4.3.2.2, 4.3.2.5
CS4	+ 2.3.2, 2.3.3 (no heap storage)
J3	n

138 4 by function call only/for certain data types

CHOL	-
IRONMAN	- 1E
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	n

139 4 by non-constant expression (for scalars and aggregates)...

CHOL	+
IRONMAN	o [5E]
J73C	+
J73I	-
PASCAL	-
PLI	+
CS4	+
J3	-

Declarations and Storage Management

140	5	for read-only variables	
		CHOL	+
		IRONMAN	+ 5A
		J73C	+
		J73I	n
		PASCAL	-
		PLI	n
		CS4	+ 2.3, 2.3.2, 2.3.3, 7.1
		J3	n
141	5	for read-only structure components	
		CHOL	+
		IRONMAN	+ 3-3G
		J73C	+
		J73I	n
		PASCAL	n
		PLI	n
		CS4	n
		J3	n
142	5	for any auto or heap variable	
		CHOL	+
		IRONMAN	+ 5A
		J73C	+
		J73I	-
		PASCAL	-
		PLI	+ 5.4.25
		CS4	+ 2.3, 2.3.2, 2.3.3
		J3	n
143	4	by a constant value only	
		CHOL	-
		IRONMAN	- 5A
		J73C	-
		J73I	-
		PASCAL	+ 5 (named constants)
		PLI	-
		CS4	-
		J3	n
144	3	for static storage...	
		CHOL	+
		IRONMAN	+ 3-5C
		J73C	+
		J73I	+
		PASCAL	-
		PLI	+ 4.3.2.1, 4.3.2.3, 5.4.25
		CS4	+ 2.3.2, 2.3.3
		J3	+

Declarations and Storage Management

150 4 permitted/not value preserving

CHOL	n *
IRONMAN	- 3B
J73C	+ (unless RESTRICTED)
J73I	+ 2.1.7.2
PASCAL	n
PLI	+ 4.3.2.1, 5.4.25
CS4	n
J3	+ 2464.2, 2470

151 3 exception conditions

CHOL	-
IRONMAN	.
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	+
J3	-

152 4 accessing uninitialized variable

CHOL	n * (initialization required)
IRONMAN	+ 10B, 13D
J73C	n * (initialization required if RESTRICTED)
J73I	-
PASCAL	-
PLI	-
CS4	+ 2.3.2 (optional)
J3	-

Declarations and Storage Management

145 4 by non-constant expression (to be evaluated once)

CHOL	-
IRONMAN	o [3-5C]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	- 2.3.3
J3	-

146 4 by a constant value

CHOL	+
IRONMAN	o [3-5C]
J73C	+
J73I	+ 2.1.7
PASCAL	+ 5 (named constants)
PLI	+ 5.4.25
CS4	+ 2.3.3
J3	+ 2464, 2467

147 3 implicit conversion...

CHOL	-
IRONMAN	.
J73C	+ (unless RESTRICTED)
J73I	+
PASCAL	-
PLI	+
CS4	-
J3	+

148 4 same rules as for assignment

CHOL	+ (i.e., none)
IRONMAN	+ 3B
J73C	+ (i.e., none if RESTRICTED)
J73I	+ 2.1.7.2
PASCAL	n
PLI	+ 4.3.2.1, 5.4.25
CS4	n
J3	+ 2464.2, 2470

149 4 permitted/value preserving

CHOL	n *
IRONMAN	- 3B
J73C	-
J73I	-
PASCAL	n
PLI	-
CS4	n
J3	-

Data Types and Operations

153 1 Data Types and Operations

CHOL o

IRONMAN o

J73C o

Integer Data Type

154 2 Integer Data Type

CHOL	+ 1.1.1
IRONMAN	+ 3-1A
J73C	+ 1.1.1
J73I	+
PASCAL	+ 6.1.2, 6.1.3
PLI	+
CS4	+ 3.2.1
J3	+

155 3 range...

CHOL	o [1.1.1]
IRONMAN	o [3-1A]
J73C	o [1.1.1]

156 4 implicitly defined by implementation

CHOL	- 1.1.1
IRONMAN	- 3-1F
J73C	- 1.1.1 (except when size not specified)
J73I	- 2.1.3.2 (except when size not specified)
PASCAL	+ 6.1.2
PLI	- 5.4.42, 4.1.5, 5.3.3 (except when size not specified)
CS4	-
J3	-

157 4 implicitly defined by size attribute

CHOL	+ 1.1.1
IRONMAN	- 3-1F
J73C	+ 1.1.1
J73I	+ 2.1.3.2
PASCAL	-
PLI	+ 5.4.42, 4.1.5
CS4	-
J3	+ 2463.3-.5

158 4 explicitly defined by programmer

CHOL	+ 1.1.1
IRONMAN	+ 3-1F
J73C	+ 1.1.1
J73I	-
PASCAL	+ 6.1.3 (subranges)
PLI	-
CS4	+ 3.2.1.1
J3	+ 2463-.5 (range of absolute value)

Integer Data Type

159 5 range attribute required

CHOL - 1.1.1
IRONMAN + 3-1F
J73C - 1.1.1
J73I n
PASCAL - 6.1.2, 6.1.3
PLI n
CS4 + 3.2.1.1
J3 -

160 5 range attribute definable at run-time

CHOL +
IRONMAN o [3-1F]
J73C +
J73I n
PASCAL - 6.1.3
PLI n
CS4 - 3.2.1.1
J3 -

161 5 range attribute redefinable (to a subrange)

CHOL -
IRONMAN o [3-1F]
J73C -
J73I n
PASCAL - 6.1.3
PLI n
CS4 -
J3 -

162 3 both signed and unsigned integers

CHOL o
IRONMAN + 3-1F, 11A, 12C (ability to specify "object repr. of
atomic data"))
J73C +
J73I + 2.1.3.2
PASCAL - 6.1
PLI -
CS4 -
J3 + 2463.3

163 3 size (precision)...

CHOL o [1.1.1]
IRONMAN o [3-1A]
J73C o [1.1.1]

Integer Data Type

- 164 4 implicitly defined by implementation
- CHOL -
 - IRONMAN + 11A, 12C
 - J73C - (except when size not specified)
 - J73I - 2.1.3.2 (except when size not specified)
 - PASCAL + 6.1
 - PLI - 5.4.42, 5.3.3 (except when size not specified)
 - CS4 + 3.2.1.1
 - J3 -
- 165 4 implicitly defined by range attribute
- CHOL + 1.1.1
 - IRONMAN + 11A, 12C
 - J73C + 1.1.1
 - J73I -
 - PASCAL ? 6.1.3
 - PLI -
 - CS4 ? 3.2.1.1
 - J3 -
- 166 4 explicitly definable by programmer
- CHOL + 1.1.1
 - IRONMAN + 11A, 12C
 - J73C + 1.1.1
 - J73I + 2.1.3
 - PASCAL -
 - PLI + 5.4.42
 - CS4 -
 - J3 + 2463.3
- 167 5 size attribute required
- CHOL -
 - IRONMAN - 11A, 12C
 - J73C -
 - J73I - 2.1.3.2
 - PASCAL n
 - PLI - 5.3.3
 - CS4 n
 - J3 +
- 168 5 multiple precision specifiable
- CHOL + 1.1.1
 - IRONMAN + 1G, 11A, 13F, 12C
 - J73C + 1.1.1
 - J73I - 2.1.3.2
 - PASCAL -
 - PLI + 5.4.42
 - CS4 -
 - J3 - 2419.1-.2

Integer Data Type

169 3 range required with size optional

CHOL	-
IRONMAN	+ 3-1F, 11A, 12C
J73C	-
J73I	n
PASCAL	n
PLI	n
CS4	n
J3	- 2463.3-.4 (size required, range optional)

170 3 units can be specified

CHOL	-
IRONMAN	o 1A, 1E
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

171 3 constants

CHOL	+ 1.1.1
IRONMAN	o {3-1A}
J73C	+ 1.1.1
J73I	+
PASCAL	+
PLI	+
CS4	+
J3	+

172 4 literals

CHOL	+ 1.1.1
IRONMAN	+ 2G, 3-1A
J73C	+ 1.1.1
J73I	+ 5.3.3
PASCAL	+ 4
PLI	+ 2.6.2.3
CS4	+ 1.3.2.2
J3	+ 2418.1, 2418.5 (bases 10 and 8)

173 5 with embedded spaces

CHOL	o
IRONMAN	o 2G
J73C	-
J73I	- 5.5, 5.2
PASCAL	- 14.6
PLI	- 2.6.4
CS4	- 1.3.2.2
J3	- 2412

Integer Data Type

- 174 5 with target machine range
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | + 2G, 1G, 3-1F |
| J73C | + (if RESTRICTED) |
| J73I | ? |
| PASCAL | ? |
| PLI | + 2.6.2.3 |
| CS4 | - 3.2.1.1 |
| J3 | ? 2408.7 |
- 175 4 mnemonic names can be specified
- | | |
|---------|-------|
| CHOL | + 1.3 |
| IRONMAN | + 5A |
| J73C | + 1.3 |
| J73I | - |
| PASCAL | + 5 |
| PLI | - |
| CS4 | + 2.3 |
| J3 | - |
- 176 5 run-time values permitted
- | | |
|---------|-------|
| CHOL | + |
| IRONMAN | + 5A |
| J73C | + |
| J73I | n |
| PASCAL | - 5 |
| PLI | n |
| CS4 | + 2.3 |
| J3 | n |
- 177 4 environmental parameters
- | | |
|---------|-------|
| CHOL | + |
| IRONMAN | + 11C |
| J73C | + |
| J73I | + |
| PASCAL | + |
| PLI | - |
| CS4 | + |
| J3 | - |
- 178 5 max and min integer value
- | | |
|---------|-----------------------------------|
| CHOL | + |
| IRONMAN | o [11C] |
| J73C | + |
| J73I | + 1.2.2 (number of bits per word) |
| PASCAL | + 2.B (maxint only) |
| PLI | - |
| CS4 | + 3.2.1.1, 8.4 |
| J3 | - |

Integer Data Type

- 179 5 representation of negative numbers
- | | |
|---------|---------|
| CHOL | + |
| IRONMAN | o [11C] |
| J73C | + |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 180 3 variables
- | | |
|---------|-------------------------|
| CHOL | + 1.1.1 |
| IRONMAN | + 5B |
| J73C | + 1.1.1 |
| J73I | + 4.1.1, 2.1.3, 2.1.4 |
| PASCAL | + 7 |
| PLI | + 4.1.3, 5.4.54, 6, 5.5 |
| CS4 | + 2.3 |
| J3 | + 2422, 2463-4 |
- 181 4 read-only access specifiable (in a subscope)
- | | |
|---------|--------|
| CHOL | + |
| IRONMAN | o 3-5B |
| J73C | + |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 182 4 NULL value specifiable
- | | |
|---------|--------|
| CHOL | - |
| IRONMAN | o [5B] |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 183 4 undefined value exists
- | | |
|---------|--------------------|
| CHOL | - |
| IRONMAN | o [5B] |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | + 2.3.2, 3.2.1.3.4 |
| J3 | - |

Integer Data Type

184 5 undefined value is specifiable

CHOL	n
IRONMAN	o [5B]
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	-
J3	n

185 3 parameter usage permitted

CHOL	+
IRONMAN	+ 7G
J73C	+
J73I	+ 2.2
PASCAL	+ 10, 9.1.2, 11, 8.2
PLI	+ 6.10
CS4	+ 5.1.1
J3	+ 2446, 2484

186 4 exact match on type required

CHOL	+
IRONMAN	- 11B, 11A, 12C, 7G
J73C	+ (if RESTRICTED)
J73I	- 2.2.3.1
PASCAL	?
PLI	- 6.10.1, 6.10.2
CS4	+ 5.1.1.1
J3	- 2446.8

187 4 inclusion match on range attribute

CHOL	+
IRONMAN	+ 10B, 13D, 7G
J73C	+ (if RESTRICTED)
J73I	-
PASCAL	?
PLI	-
CS4	+
J3	-

188 5 actual input range must be included in formal input range

CHOL	-
IRONMAN	o [10B, 13D, 7G]
J73C	-
J73I	-
PASCAL	?
PLI	-
CS4	- 5.1.1.1, 3.2.1.3.2
J3	-

Integer Data Type

- 189 5 formal output range must be included in actual output range
- CHOL -
 - IRONMAN o [10B, 13D, 7G]
 - J73C -
 - J73I -
 - PASCAL ?
 - PLI -
 - CS4 - 5.1.1.1, 3.2.1.3.2
 - J3 -
- 190 5 ranges of inout parameters must match exactly
- CHOL -
 - IRONMAN o [10B, 13D, 7G]
 - J73C -
 - J73I -
 - PASCAL ?
 - PLI -
 - CS4 + 5.1.1.1 (REF parameters)
 - J3 -
- 191 5 ranges must overlap
- CHOL +
 - IRONMAN + 10B, 13B, 3-1F, 7G
 - J73C + (if RESTRICTED)
 - J73I -
 - PASCAL ?
 - PLI -
 - CS4 + 5.1.1.1, 3.2.1.3.2 (COPY parameters)
 - J3 -
- 192 5 range exception for parameters
- CHOL + (need to control whether or not check is performed)
 - IRONMAN + 10B, 13D
 - J73C + (need to control whether or not check is performed)
 - J73I -
 - PASCAL -
 - PLI -
 - CS4 + 3.2.1.3.2 (assign exception)
 - J3 -
- 193 5 range relationships not considered
- CHOL -
 - IRONMAN - 10B, 13D
 - J73C + (unless RESTRICTED)
 - J73I + 2.2.3
 - PASCAL ?
 - PLI + 6.10
 - CS4 -
 - J3 + 2446.8

Integer Data Type

- 194 4 other safe matches (e.g., units)
- | | |
|---------|---|
| CHOL | - |
| IRONMAN | n |
| J73C | - |
| J73I | - |
| PASCAL | ? |
| PLI | - |
| CS4 | - |
| J3 | - |
- 195 4 conversion of output parameters (write-only) permitted
- | | |
|---------|-----------------------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | + (unless RESTRICTED) |
| J73I | + 2.2.3.1 |
| PASCAL | n |
| PLI | n 6.10.1 |
| CS4 | - |
| J3 | + 2446.8 |
- 196 4 conversion of input parameters (read-only) permitted
- | | |
|---------|-----------------------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | + (unless RESTRICTED) |
| J73I | + 2.2.3.1 |
| PASCAL | ? |
| PLI | + 6.10.1, 6.10.2 |
| CS4 | - |
| J3 | + 2446.8 |
- 197 4 same conversions as permitted in assignment statements
- | | |
|---------|------------------------------|
| CHOL | + (i.e., none) |
| IRONMAN | + 3B |
| J73C | + (i.e., none if RESTRICTED) |
| J73I | + 2.2.3.1 |
| PASCAL | ? |
| PLI | + 6.10.2 |
| CS4 | + 5.1.1.1 (i.e., none) |
| J3 | + 2446.8 |
- 198 3 function values
- | | |
|---------|----------------------|
| CHOL | + |
| IRONMAN | + 7D |
| J73C | + |
| J73I | + 2.2.2 |
| PASCAL | + 11 |
| PLI | + 12.21, 5.4.47, 6.7 |
| CS4 | + 5.1 |
| J3 | + 2432, 2485 |

Integer Data Type

199 3 index data type

CHOL - (depends on how subrange types are represented)
IRONMAN - 1E
J73C - (depends on how subrange types are represented)
J73I - -
PASCAL -
PLI -
CS4 -
J3 -

200 3 addition and subtraction

CHOL + 1.1.1
IRONMAN + 3-1B
J73C + 1.1.1
J73I + 4.8, 5.2.2
PASCAL + 8.1.3
PLI + 7.3.1
CS4 + 3.2.1.4.1, 3.2.4.1.1, 3.2.4.2.1
J3 + 2434

201 3 negation

CHOL + 1.1.1
IRONMAN + 3-1B
J73C + 1.1.1
J73I + 4.8
PASCAL + 8.1.3
PLI + 7.3.1
CS4 + 3.2.1.4.1, 3.2.4.1.2
J3 + 2434

202 4 parentheses required

CHOL -
IRONMAN o [3-1B]
J73C -
J73I - 4.8.1
PASCAL - 8
PLI - 7.2
CS4 - 3.2.4
J3 - 2434.2

203 3 multiplication

CHOL + 1.1.1
IRONMAN + 3-1B
J73C + 1.1.1
J73I + 4.8, 5.2.2
PASCAL + 8.1.2
PLI + 7.3.1
CS4 + 3.2.1.4.1, 3.2.4.2.1
J3 + 2434

Integer Data Type

204 3 division (integer result)

CHOL	+ 1.1.1
IRONMAN	+ 3-1H
J73C	+ 1.1.1
J73I	+ 4.8, 5.2.2
PASCAL	+ 8.1.2
PLI	+ 7.3.1, 13.2.8, 7.3.1.2.2
CS4	+ 3.2.1.4.1, 3.2.4.2.2
J3	+ 2486 (function)

205 4 symbols for integer and real division are the same

CHOL	o
IRONMAN	o 2D
J73C	+
J73I	+ 4.8, 5.2.2
PASCAL	-
PLI	+ 7.3.1
CS4	-
J3	-

206 4 symbols for integer and real division are different

CHOL	o
IRONMAN	o 2D
J73C	-
J73I	-
PASCAL	+ 8.1.2
PLI	-
CS4	+ 3.2.1.4.1
J3	+ 2434, 2486

207 4 parentheses required

CHOL	-
IRONMAN	+ 4G
J73C	-
J73I	- 4.8.1
PASCAL	- 8
PLI	- 7.2
CS4	- 3.2.4
J3	-

208 3 exponentiation (integer result)

CHOL	- 1.1.1
IRONMAN	- 3-1B
J73C	+ 1.1.1
J73I	+ 4.8, 5.2.2
PASCAL	-
PLI	+ 7.3.1.2.2
CS4	+ 3.2.1.4.1, 3.2.4.2.4 (real result)
J3	+ 2434

Integer Data Type

209 4 by multiplication

CHOL	n * [1.1.1]
IRONMAN	n * [3-1B]
J73C	+
J73I	+ 4.8.2
PASCAL	n
PLI	+ 7.3.1.2.2
CS4	+ 3.2.4 (for integer exponents)
J3	+ 2434.7-.8

210 4 by logarithms

CHOL	n * [1.1.1]
IRONMAN	n * [3-1B]
J73C	-
J73I	-
PASCAL	n
PLI	-
CS4	+ (for noninteger exponents)
J3	-

211 4 constant exponent only

CHOL	n * [1.1.1]
IRONMAN	n * [3-1B]
J73C	+
J73I	+ 4.8.2
PASCAL	n
PLI	+ 7.3.1.2.2
CS4	-
J3	+ 2434.7

212 4 variable exponent permitted

CHOL	n * [1.1.1]
IRONMAN	n * [3-1B]
J73C	-
J73I	-
PASCAL	n
PLI	-
CS4	+ 3.2.4
J3	-

213 4 integer and real exponentiation symbols are different

CHOL	n * [1.1.1]
IRONMAN	n * [3-1B]
J73C	-
J73I	-
PASCAL	n
PLI	- 7.3.1
CS4	-
J3	- 2434

Integer Data Type

214	4	right associative	
		CHOL	n * [1.1.1]
		IRONMAN	n * [3-1B]
		J73C	-
		J73I	-
		PASCAL	n
		PLI	+ 7.2
		CS4	+ 3.2.4
		J3	-
215	4	left associative	
		CHOL	n * [1.1.1]
		IRONMAN	n * [3-1B]
		J73C	+
		J73I	+ 4.8.3
		PASCAL	n
		PLI	-
		CS4	-
		J3	+ 22434.4
216	4	parentheses required	
		CHOL	n * [1.1.1]
		IRONMAN	n * [3-1B]
		J73C	-
		J73I	- 4.8.1
		PASCAL	n
		PLI	- 7.2
		CS4	- 3.2.4
		J3	- 2434
217	3	modulus	
		CHOL	+ 1.1.1
		IRONMAN	+ 3-1H
		J73C	+ 1.1.1
		J73I	+ 4.8, 5.2.2
		PASCAL	+ 8.1.2
		PLI	+ 13.2.15
		CS4	-
		J3	+ 2486 (procedure)
218	3	absolute value	
		CHOL	-
		IRONMAN	- 3-1B
		J73C	+
		J73I	+ 4.10.7
		PASCAL	+ 11.1.1
		PLI	+ 13.2.1
		CS4	+ 3.2.1.4.4.1
		J3	+ 2434.2-.3

Integer Data Type

219 3 ODD operator (produces Boolean result)

CHOL	o
IRONMAN	- 3-1B
J73C	+ (via UNSPEC)
J73I	+ 4.10.4 (via UNSPEC)
PASCAL	+ 11.1.2
PLI	-
CS4	-
J3	+ 2429

220 3 max/min operator

CHOL	-
IRONMAN	- 3-1B
J73C	-
J73I	-
PASCAL	-
PLI	+ 13.2.13, 13.2.14
CS4	-
J3	-

221 4 only two values

CHOL	n *
IRONMAN	n * [3-1B]
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

222 4 more than two values

CHOL	n *
IRONMAN	n * [3-1B]
J73C	n
J73I	n
PASCAL	n
PLI	+ 13.2.13, 13.2.14
CS4	n
J3	n

223 3 random number generators

CHOL	-
IRONMAN	- 1A
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

Integer Data Type

224 3 relational operators

CHOL + 1.1.1
IRONMAN + 3-1B
J73C + 1.1.1
J73I + 4.6, 5.2.2
PASCAL + 8.1.4
PLI + 7.3.4
CS4 + 3.2.1.4.2
J3 +

225 4 equality/inequality

CHOL + 1.1.1
IRONMAN + 3-1B
J73C + 1.1.1
J73I + 4.6, 5.2.2
PASCAL + 8.1.4
PLI + 7.3.4
CS4 + 3.2.1.4.2
J3 + 2437

226 4 algebraic comparisons

CHOL + 1.1.1
IRONMAN + 3-1B
J73C + 1.1.1
J73I + 4.6, 5.2.2
PASCAL + 8.1.4
PLI + 7.3.4
CS4 + 3.2.1.4.2
J3 + 2437

227 4 chained comparisons

CHOL o
IRONMAN o 3-1B, 6C (range checks in case statements)
J73C -
J73I -
PASCAL -
PLI -
CS4 -
J3 + 2439

228 3 assignment

CHOL +
IRONMAN + 5F
J73C +
J73I + 3.3
PASCAL + 9.1.1
PLI + 12.2
CS4 + 4.2, 3.2.1.3.2
J3 + 2442

Integer Data Type

- 229 4 exact match on type
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | + 3B |
| J73C | + (if RESTRICTED) |
| J73I | - 3.3, 1.7 |
| PASCAL | + 9.1.1 |
| PLI | - 12.2 |
| CS4 | + 4.2, 3.2.1.3.2 |
| J3 | - 2442.3 |
- 230 4 inclusion match on range attribute
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | o [5F] |
| J73C | + (if RESTRICTED) |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | + |
| J3 | - 2442 |
- 231 5 source range must be included in target range
- | | |
|---------|--------|
| CHOL | - |
| IRONMAN | o [5F] |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 232 5 ranges must match exactly
- | | |
|---------|--------|
| CHOL | - |
| IRONMAN | o [5F] |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 233 5 ranges must overlap
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | + 10B, 13D |
| J73C | + (if RESTRICTED) |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | + 3.2.1.3.2 |
| J3 | - |

Integer Data Type

- 234 5 range relationships not considered
- | | |
|---------|-----------------------|
| CHOL | - |
| IRONMAN | - 10B, 13D |
| J73C | + (unless RESTRICTED) |
| J73I | + 3.3 |
| PASCAL | + 9.1.1 |
| PLI | + 12.2 |
| CS4 | - |
| J3 | + 2442 |
- 235 4 implicit conversion from integer-interpretable types
- | | |
|---------|-----------------------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | + (unless RESTRICTED) |
| J73I | + |
| PASCAL | - |
| PLI | + |
| CS4 | - |
| J3 | - |
- 236 5 from single character
- | | |
|---------|--------|
| CHOL | n * |
| IRONMAN | n * 3B |
| J73C | n |
| J73I | n |
| PASCAL | - |
| PLI | n |
| CS4 | n |
| J3 | n |
- 237 5 from character string (UNSPEC)
- | | |
|---------|--------|
| CHOL | n * |
| IRONMAN | n * 3B |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 238 5 from boolean
- | | |
|---------|-----------------------|
| CHOL | n * |
| IRONMAN | n * 3B |
| J73C | + (unless RESTRICTED) |
| J73I | n |
| PASCAL | - |
| PLI | n |
| CS4 | - |
| J3 | - |

Integer Data Type

239 5	from bit	
	CHOL	n *
	IRONMAN	n
	J73C	+ (unless RESTRICTED)
	J73I	+ 3.3, 1.7
	PASCAL	n
	PLI	+ 12.2, 8.2.5
	CS4	n
	J3	n
240 5	from status	
	CHOL	n *
	IRONMAN	n * 3B
	J73C	+ (unqualified status constants, unless RESTRICTED)
	J73I	+ 3.3, 1.7, 5.3.3.1, 2.4.2 (unqualified status constants)
	PASCAL	-
	PLI	n
	CS4	-
	J3	-
241 5	from pointer	
	CHOL	n *
	IRONMAN	n * 3B
	J73C	+ (untyped, unless RESTRICTED)
	J73I	+ 3.3, 1.7 (pointers are integers)
	PASCAL	-
	PLI	-
	CS4	n
	J3	n
242 5	from other data types	
	CHOL	n *
	IRONMAN	n * 3B
	J73C	-
	J73I	-
	PASCAL	-
	PLI	-
	CS4	-
	J3	-

Integer Data Type

- 243 4 implicit conversion from real
- | | |
|---------|----------------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | - |
| J73I | - 3.3, 1.7 |
| PASCAL | - |
| PLI | + 8.2.10, 12.2 |
| CS4 | - |
| J3 | + 2442.3, 2435 |
- 244 5 by truncation
- | | |
|---------|-------------------------|
| CHOL | n * |
| IRONMAN | n * 3B |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | + 8.2.10, 12.2, 7.3.1.2 |
| CS4 | n |
| J3 | - |
- 245 5 by rounding
- | | |
|---------|--------|
| CHOL | n * |
| IRONMAN | n * 3B |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | - |
| CS4 | n |
| J3 | - |
- 246 5 rounding/truncation is implementation-dependent
- | | |
|---------|-----|
| CHOL | n * |
| IRONMAN | n |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | - |
| CS4 | n |
| J3 | - |
- 247 6 determinable by environmental query
- | | |
|---------|-----|
| CHOL | n * |
| IRONMAN | n |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | - |
| CS4 | n |
| J3 | - |

Integer Data Type

- 248 5 rounding/truncation depends on target variable
- | | |
|---------|-------------|
| CHOL | n * |
| IRONMAN | n |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | - |
| CS4 | n |
| J3 | + 2463.3-.5 |
- 249 4 implicit conversion from non-integer interpretable types
- | | |
|---------|------------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | - |
| J73I | - 3.3, 1.7 |
| PASCAL | - |
| PLI | + |
| CS4 | - |
| J3 | - |
- 250 5 from character (as in input conversion)
- | | |
|---------|---------------|
| CHOL | n * |
| IRONMAN | n * 3B |
| J73C | n * |
| J73I | - |
| PASCAL | - |
| PLI | + 8.2.3, 12.2 |
| CS4 | - |
| J3 | - |
- 251 3 expression evaluation
- | | |
|---------|-----------|
| CHOL | o [1.1.1] |
| IRONMAN | o [3-1A] |
| J73C | o [1.1.1] |
- 252 4 implicit conversion in evaluating operands
- | | |
|---------|-----------------------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | + (unless RESTRICTED) |
| J73I | + 4.8, 1.7 |
| PASCAL | - 8 |
| PLI | + 7.3.1.1 |
| CS4 | - |
| J3 | + 2434.6 |

Integer Data Type

253 4 evaluation order of operands...

CHOL	o [1.1.1]
IRONMAN	o [3-1A]
J73C	o [1.1.1]
J3	2490-4

254 5 strictly left-to-right

CHOL	-
IRONMAN	- 4C, 1D
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	+ 3.0
J3	+ 2431, 2434.4, 2442.3

255 5 left-to-right within equal precedence

CHOL	-
IRONMAN	- 4C, 1D
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

256 5 order not specified

CHOL	+
IRONMAN	+ 4C, 1D, 10E
J73C	+
J73I	+ 4.8.3
PASCAL	+ 8
PLI	+ 7.1.4
CS4	-
J3	-

257 3 constant expression evaluation

CHOL	+
IRONMAN	+ 4E
J73C	+
J73I	+ 4.9
PASCAL	-
PLI	-
CS4	+ 7.1
J3	-

Integer Data Type

258 4 for integers in declarations

CHOL	+
IRONMAN	+ 4E
J73C	+
J73I	+ 2.1.3, 2.1.5, 2.1.7 (except array bounds 2.1.5.3)
PASCAL	-
PLI	-
CS4	+ 7.1
J3	-

259 4 with target machine range and accuracy

CHOL	+
IRONMAN	+ 13F, 1G, 4E
J73C	+ (if RESTRICTED)
J73I	?
PASCAL	-
PLI	-
CS4	?
J3	-

260 4 applied to the basic operators: + - * /

CHOL	+
IRONMAN	+ 4E, 3-1B, 3-1H
J73C	+
J73I	+ 4.9, 5.2.2
PASCAL	-
PLI	-
CS4	+ 7.1
J3	-

261 4 exponentiation

CHOL	n
IRONMAN	n 3-1B
J73C	+
J73I	- 4.9.2
PASCAL	n
PLI	-
CS4	+ 7.1
J3	-

262 4 modulus

CHOL	+
IRONMAN	+ 4E, 3-1H
J73C	+
J73I	+ 4.9, 5.2.2
PASCAL	-
PLI	-
CS4	n
J3	-

Integer Data Type

263 4 absolute value

CHOL	n
IRONMAN	n 3-1B
J73C	+
J73I	+ 4.9.1
PASCAL	-
PLI	-
CS4	-
J3	-

264 4 max/min

CHOL	n
IRONMAN	n 3-1B
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

265 4 conversions

CHOL	+
IRONMAN	o [4E]
J73C	+
J73I	+
PASCAL	-
PLI	-
CS4	+
J3	-

266 5 implicit

CHOL	n
IRONMAN	? 3B, 4B, 4E
J73C	+
J73I	+ 4.9 (bit constants only)
PASCAL	n
PLI	-
CS4	n
J3	-

267 5 explicit

CHOL	+
IRONMAN	? 3B, 4B, 4E (except for comment in 4B)
J73C	+
J73I	+ 4.9
PASCAL	-
PLI	-
CS4	+ 7.1
J3	-

Integer Data Type

268 4 relational operators

CHOL	+
IRONMAN	+ 3-1B, 6C, 4E
J73C	+
J73I	+ 4.9, 5.2.2
PASCAL	-
PLI	-
CS4	+ 7.1
J3	-

269 4 programmer-defined functions

CHOL	-
IRONMAN	o [4E]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

270 3 explicit conversion to integer

CHOL	+
IRONMAN	o [3-1A]
J73C	+
J73I	+ 1.7
PASCAL	+ 8, 9.1.1
PLI	+
CS4	+
J3	+

271 4 from real

CHOL	+
IRONMAN	+ 3-1B, 3B
J73C	+
J73I	+
PASCAL	+
PLI	+
CS4	+
J3	-

272 5 by rounding

CHOL	o
IRONMAN	+ 3-1B, 1C
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	n

Integer Data Type

273 5 by truncation

CHOL	+
IRONMAN	+ 3-1B, 1C
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	n

274 5 rounding/truncation programmer specified

CHOL	+
IRONMAN	+ 1C, 3-1B
J73C	- (by extension)
J73I	-
PASCAL	+ 11.1.3
PLI	+ 13.2.9, 13.2.19, 13.2.22
CS4	+ 3.2.2.4.4
J3	n

275 5 rounding/truncation implementation dependent

CHOL	~
IRONMAN	~ 1G
J73C	+
J73I	+ 1.7.1.2.2
PASCAL	-
PLI	-
CS4	-
J3	n

276 4 from character string (as in input conversion)

CHOL	- (by extension)
IRONMAN	+ 2G, 4B (to ensure program/data literals converted equivalently)
J73C	- (by extension)
J73I	-
PASCAL	-
PLI	+ 13.2.9
CS4	+ 3.2.1.4.3
J3	-

Integer Data Type

277	4	from single character	
		CHOL	+ (char(1))
		IRONMAN	+ 4B
		J73C	+ (char(1))
		J73I	n
		PASCAL	+ 11.1.3
		PLI	n
		CS4	n
		J3	n
278	4	from character string (UNSPEC)	
		CHOL	-
		IRONMAN	+ 4B
		J73C	+
		J73I	+ 1.7.1.2.2
		PASCAL	-
		PLI	-
		CS4	-
		J3	+ 2426.6
279	4	from boolean	
		CHOL	+
		IRONMAN	? 4B
		J73C	+
		J73I	n
		PASCAL	+ 11.1.3
		PLI	n
		CS4	-
		J3	+ 2426.6 (UNSPEC)
280	4	from bit	
		CHOL	+
		IRONMAN	? 4B
		J73C	+
		J73I	+ 1.7.1.2.2
		PASCAL	n
		PLI	+ 13.2.9
		CS4	n
		J3	n
281	4	from status	
		CHOL	+
		IRONMAN	? 4B
		J73C	+
		J73I	+ 2.4 (qualified status constants)
		PASCAL	+ 11.1.3
		PLI	n
		CS4	+ 3.2.1.4.3
		J3	+ 2426.6 (UNSPEC)

Integer Data Type

282 4 from pointer

CHOL	+
IRONMAN	? 4B
J73C	+
J73I	- (pointers are integers)
PASCAL	-
PLI	-
CS4	n
J3	+ 2434.2, 2434.10 (ADDR function)

283 4 from other data types

CHOL	+
IRONMAN	? 4B
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	+ 2426.6 (UNSPEC)

284 3 exception conditions

CHOL	+
IRONMAN	o [3-1A]
J73C	+
J73I	+
PASCAL	-
PLI	+
CS4	+
J3	-

285 4 overflow exception

CHOL	+
IRONMAN	+ 3-1A, 10B, 13D
J73C	+
J73I	-
PASCAL	-
PLI	+ 10.4.7, 10.4.12
CS4	+
J3	-

286 5 for + - * /

CHOL	+
IRONMAN	+ 3-1A
J73C	+
J73I	-
PASCAL	-
PLI	+ 10.4.7, 10.4.12
CS4	+ 3.2.4.2
J3	- 2435

Integer Data Type

287 5	conversion	
	CHOL	+
	IRONMAN	+ 3-1A
	J73C	+
	J73I	-
	PASCAL	-
	PLI	+ 10.4.12
	CS4	+ 3.2.1.4.3
	J3	-
288 4	zero divide	
	CHOL	+
	IRONMAN	+ 10B, 13D
	J73C	+
	J73I	-
	PASCAL	-
	PLI	+ 10.4.20
	CS4	+
	J3	-
289 5	division	
	CHOL	+
	IRONMAN	+ 10B, 13D
	J73C	+
	J73I	-
	PASCAL	-
	PLI	+ 10.4.20
	CS4	+ 3.2.4.2
	J3	- 2435, 2434.4
290 5	modulus	
	CHOL	+
	IRONMAN	+ 10B, 13D
	J73C	+
	J73I	-
	PASCAL	-
	PLI	- 13.2.15
	CS4	-
	J3	-
291 4	logarithm of negative base	
	CHOL	n
	IRONMAN	n 3-1B
	J73C	+
	J73I	-
	PASCAL	-
	PLI	+ 7.3.1.2.3
	CS4	- 3.2.4.2.4
	J3	- 2434.4

Integer Data Type

292 4 range (on assignment)

CHOL	+
IRONMAN	+ 10B, 13D
J73C	+ (if RESTRICTED)
J73I	-
PASCAL	- 14.B (an option in PASCAL 6000-3.4)
PLI	-
CS4	+ 3.2.1.3.2
J3	-

293 4 conversion error (ill formed number)

CHOL	+
IRONMAN	+ 10B
J73C	+
J73I	+ 1.7.1 (go to an error label)
PASCAL	-
PLI	+ 10.4.2
CS4	+ 3.2.1.4.3
J3	-

Real Data Type

294 2 Real Data Type

CHOL	+ 1.1.2
IRONMAN	+ 3-1A
J73C	+ 1.1.2
J73I	+
PASCAL	+ 6.1.2
PLI	+
CS4	+ 3.2.2, 3.2.3
J3	+

295 3 representations supported...

CHOL	o [1.1.2]
IRONMAN	o [3-1A]
J73C	o [1.1.2]

296 4 both fixed and floating point are available

CHOL	-
IRONMAN	+ 3-1A
J73C	-
J73I	-
PASCAL	-
PLI	+ 4.1.5, 5.4.21, 5.4.22
CS4	+ 3.2.2, 3.2.3
J3	+ 2416.6-.7, 2463

297 4 only one representation is available

CHOL	+ (float only)
IRONMAN	- 3-1A, 13C
J73C	+ (float)
J73I	+ 2.1.3 (float)
PASCAL	+ 6.1.2 (float)
PLI	-
CS4	-
J3	-

298 4 fixed/float representations not both necessarily supported

CHOL	n
IRONMAN	- 3-1A, 13C
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	-
J3	-

Real Data Type

299 5 supported representations defined by enquiry

CHOL	n *
IRONMAN	n
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	+ 8.4
J3	-

300 4 fixed point is fraction part only

CHOL	n
IRONMAN	- 3-1E
J73C	n
J73I	n
PASCAL	n
PLI	- 5.4.42
CS4	+ 3.2.3
J3	- 2463.6-.8

301 4 complex data type available

CHOL	-
IRONMAN	- 3-1A, 1A
J73C	-
J73I	-
PASCAL	-
PLI	+ 4.1.5, 5.4.9
CS4	+ B.COMPLEX
J3	+ 2463.9-.11, 2416.9 (partly via dual type)

302 5 properties and operations essentially same as for real data type

CHOL	n *
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	+
CS4	+
J3	+

303 3 range...

CHOL	o [1.1.2]
IRONMAN	o [3-1A]
J73C	o [1.1.2]

Real Data Type

304 4 implicitly defined by implementation

CHOL + 1.1.2
IRONMAN + 3-1A (for floating point variables)
J73C - 1.1.2 (except when size not specified)
J73I - 2.1.3.2 (except when size not specified)
PASCAL + 6.1.2
PLI - 5.4.42, 4.1.5, 5.3.3 (except when size not specified)
CS4 -
J3 + 2463.1 (floating)

305 4 implicitly defined by size attribute

CHOL -
IRONMAN ? 3-1A, 3-1C (for floating point variables)
J73C +
J73I + 2.1.3.2
PASCAL -
PLI + 5.4.42, 4.1.5
CS4 -
J3 + 2463.6-.8 (fixed)

306 4 explicitly definable by programmer

CHOL +
IRONMAN + 3-1F, 3-1A (for fixed point only)
J73C +
J73I - 2.1.3.2
PASCAL - 5.B
PLI -
CS4 + 3.2.2.1
J3 + 2463.6-.8 (fixed, absolute values)

307 5 range attribute required

CHOL -
IRONMAN + 3-1F, 3-1A (fixed point only)
J73C -
J73I n
PASCAL n
PLI n
CS4 + 3.2.2.1
J3 -

308 5 range attribute definable at run-time

CHOL +
IRONMAN o [3-1F, 3-1A (for fixed point only)]
J73C +
J73I n
PASCAL n
PLI n
CS4 -
J3 -

Real Data Type

309 5 range attribute redefinable (to a subrange)

CHOL	-
IRONMAN	o [3-1F, 3-1A (for fixed point only)]
J73C	-
J73I	n
PASCAL	n
PLI	n
CS4	-
J3	-

310 4 use of range to scale fixed point calculations

CHOL	n
IRONMAN	o [3-1A]
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	-
J3	+ 2463.8, 2463.5, 2435

311 3 accuracy...

CHOL	o [1.1.2]
IRONMAN	o [3-1A]
J73C	o [1.1.2]

312 4 floating point...

CHOL	+ 1.1.2
IRONMAN	o [3-1A]
J73C	+ 1.1.2
J73I	+
PASCAL	+
PLI	+
CS4	+
J3	+

313 5 implementation-dependent accuracy (precision)

CHOL	+
IRONMAN	+ 3-1D
J73C	- (except when size not specified)
J73I	- 2.1.3.2 (except when size not specified)
PASCAL	+ 6.1.2
PLI	- 5.4.42, 4.1.5, 5.3.3 (except when size not specified)
CS4	-
J3	+ 2463.1-.2

Real Data Type

314 5 explicitly definable accuracy (precision)

CHOL	-
IRONMAN	+ 3-1C
J73C	+
J73I	+
PASCAL	-
PLI	+
CS4	+
J3	-

315 6 in bits

CHOL	n
IRONMAN	o {3-1C}
J73C	+
J73I	+ 2.1.3.2
PASCAL	-
PLI	+ 4.1.5, 5.4.5, 5.4.42
CS4	-
J3	-

316 6 representation independent

CHOL	n
IRONMAN	o {3-1C}
J73C	-
J73I	-
PASCAL	-
PLI	+ 4.1.5, 5.4.13, 5.4.42
CS4	+ 3.2.2.1
J3	-

317 5 environmental enquiries

CHOL	+
IRONMAN	+ 3-1D
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	+ 8.4
J3	-

318 5 single and double precision, at least

CHOL	-
IRONMAN	o 3-1D, 13C, 13F
J73C	-
J73I	-
PASCAL	-
PLI	+ 5.4.42
CS4	+ 3.2.2.1
J3	- 2419.2

Real Data Type

319 4	fixed point...	
	CHOL	n
	IRONMAN	o [3-1A]
	J73C	n
	J73I	n
	PASCAL	n
	PLI	+
	CS4	+ 3.2.3 (fraction only)
	J3	+
320 5	implementation-dependent accuracy (scale)	
	CHOL	n *
	IRONMAN	- 3-1G
	J73C	n
	J73I	n
	PASCAL	n
	PLI	- 5.4.42, 4.1.5, 5.3.3 (except when size not specified)
	CS4	-
	J3	-
321 5	explicitly definable accuracy (scale)	
	CHOL	n *
	IRONMAN	+ 3-1G
	J73C	n
	J73I	n
	PASCAL	n
	PLI	+
	CS4	+
	J3	+
322 6	in bits	
	CHOL	n *
	IRONMAN	+ 3-1G
	J73C	n
	J73I	n
	PASCAL	n
	PLI	+ 4.1.5, 5.4.5, 5.4.42
	CS4	-
	J3	+ 2463.6 -.8
323 6	representation independent	
	CHOL	n *
	IRONMAN	+ 3-1G
	J73C	n
	J73I	n
	PASCAL	n
	PLI	+ 4.1.5, 5.4.13, 5.4.42
	CS4	+ 3.2.3.1
	J3	-

Real Data Type

- 324 5 exact representation
- | | |
|---------|---|
| CHOL | n * |
| IRONMAN | + 3-1E |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | + 5.4.5, 5.4.13 (limited to bases 2 and 10) |
| CS4 | - |
| J3 | - |
- 325 5 environmental enquiries
- | | |
|---------|------------|
| CHOL | n * |
| IRONMAN | o 11D, 11C |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | - |
| CS4 | + 8.4 |
| J3 | - |
- 326 5 single and double precision, at least
- | | |
|---------|-------------|
| CHOL | n * |
| IRONMAN | ? 13F, 13C |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | + 5.4.42 |
| CS4 | - 3.2.3.1 |
| J3 | - 2419.1-.2 |
- 327 5 position of radix point...
- | | |
|---------|----------|
| CHOL | n * |
| IRONMAN | o [3-1A] |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | - |
| CS4 | - |
| J3 | - |
- 328 6 programmer-definable
- | | |
|---------|----------------------|
| CHOL | n * |
| IRONMAN | ? 11B, 12C, 11A, 12C |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | - |
| CS4 | - |
| J3 | - 2463.6-.8 |

Real Data Type

- 329 6 default definable
- | | |
|---------|----------------------|
| CHOL | n * |
| IRONMAN | + 11B, 12C, 11A, 12C |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | - |
| CS4 | - |
| J3 | - |
- 330 3 size (precision)...
- | | |
|---------|-----------|
| CHOL | o [1.1.2] |
| IRONMAN | o [3-1A] |
| J73C | o [1.1.2] |
- 331 4 implicitly defined by implementation
- | | |
|---------|--|
| CHOL | + |
| IRONMAN | - 3-1F |
| J73C | - (except when size not specified) |
| J73I | - 2.1.3.2 (except when not specified) |
| PASCAL | + 6.1.2 |
| PLI | - 5.4.42, 4.1.5, 5.3.3 (except when not specified) |
| CS4 | + 3.2.3.1 |
| J3 | + 2463.1-.2 (floating) |
- 332 4 implicitly defined by range attribute
- | | |
|---------|--------|
| CHOL | - |
| IRONMAN | + 3-1F |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 333 4 implicitly defined by accuracy attribute
- | | |
|---------|--------|
| CHOL | - |
| IRONMAN | - 3-1F |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |

Real Data Type

334 4 explicitly defined by programmer

CHOL	-
IRONMAN	+ 11B, 12C, 11A, 12C
J73C	+
J73I	+ 2.1.3.2
PASCAL	-
PLI	+ 5.4.42
CS4	-
J3	+ 2463.6-.8 (fixed)

335 5 size attribute required

CHOL	n *
IRONMAN	- 11A, 12C
J73C	-
J73I	-
PASCAL	n
PLI	- 5.3.3
CS4	n
J3	+ 2463.6-.8 (fixed)

336 3 units can be specified

CHOL	-
IRONMAN	? 1A, 1E
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

337 3 constants...

CHOL	+
IRONMAN	o [3-1A]
J73C	+
J73I	+
PASCAL	+
PLI	+
CS4	+
J3	+

338 4 literals

CHOL	+
IRONMAN	+ 2G
J73C	+
J73I	+ 5.3.3
PASCAL	+ 4
PLI	+ 2.6.2.3
CS4	+ 1.3.2.3
J3	+

Real Data Type

- 339 5 with embedded spaces
- | | |
|---------|------------|
| CHOL | o |
| IRONMAN | o 2G |
| J73C | - |
| J73I | - 5.5, 5.2 |
| PASCAL | - 14.6 |
| PLI | - 2.6.4 |
| CS4 | - 1.3.2.3 |
| J3 | - 2412 |
- 340 5 alternate forms indicate representation
- | | |
|---------|------------------|
| CHOL | n |
| IRONMAN | o 2G, 3-1C |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | + 2.6.2.3 |
| CS4 | - |
| J3 | + 2417.2, 2417.4 |
- 341 5 representation indicated by context
- | | |
|---------|------------|
| CHOL | n |
| IRONMAN | o 2G, 3-1C |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 342 5 with target machine accuracy and range
- | | |
|---------|----------------------|
| CHOL | + |
| IRONMAN | + 2G, 1G, 3-1C, 3-1E |
| J73C | + (if RESTRICTED) |
| J73I | ? |
| PASCAL | ? |
| PLI | + 2.6.2.3 |
| CS4 | ? |
| J3 | ? 2408.7 |
- 343 5 program and data literals convert equivalently
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | + 2G |
| J73C | + (if RESTRICTED) |
| J73I | ? |
| PASCAL | ? |
| PLI | ? |
| CS4 | ? |
| J3 | ? |

Real Data Type

344 4 mnemonic names can be specified

CHOL	+
IRONMAN	+ 5A
J73C	+
J73I	-
PASCAL	+ 5
PLI	-
CS4	+ 2.3
J3	-

345 5 all properties specified

CHOL	+
IRONMAN	o [5A]
J73C	+
J73I	n
PASCAL	+ 5
PLI	n
CS4	+ 2.3
J3	n

346 5 properties determined by context

CHOL	-
IRONMAN	o [5A]
J73C	-
J73I	n
PASCAL	- 5
PLI	n
CS4	-
J3	n

347 5 properties determined by literal's form

CHOL	+
IRONMAN	o [5A]
J73C	+
J73I	n
PASCAL	+ 5
PLI	n
CS4	-
J3	n

348 5 run-time values permitted

CHOL	+
IRONMAN	+ 5A
J73C	+
J73I	n
PASCAL	- 5
PLI	n
CS4	+ 2.3
J3	n

Real Data Type

349 3 variables

CHOL + 1.1.2
 IRONMAN + 5B
 J73C + 1.1.2
 J73I + 4.11, 2.1.3, 2.1.4
 PASCAL + 7
 PLI + 4.1.3, 5.4.54, 6, 5.5
 CS4 + 2.3
 J3 + 2422, 2463-4

350 4 read only access specifiable (in a subscope)

CHOL +
 IRONMAN o 3-5B
 J73C +
 J73I -
 PASCAL -
 PLI -
 CS4 -
 J3 -

351 4 NULL value specifiable

CHOL -
 IRONMAN o [5B]
 J73C -
 J73I -
 PASCAL -
 PLI -
 CS4 -
 J3 -

352 4 undefined value exists

CHOL -
 IRONMAN o [5B]
 J73C -
 J73I -
 PASCAL -
 PLI -
 CS4 + 2.3.2, 3.2.2.3.4
 J3 -

353 5 is specifiable

CHOL n
 IRONMAN o [5B]
 J73C n
 J73I n
 PASCAL n
 PLI n
 CS4 -
 J3 n

Real Data Type

354 3 parameters

CHOL +
IRONMAN + 7G
J73C +
J73I + 2.2
PASCAL + 10, 9.1.2, 11, 8.2
PLI + 6.10
CS4 + 5.1.1
J3 + 2446, 2484

355 4 exact match on type required

CHOL +
IRONMAN o [7G]
J73C + (if RESTRICTED)
J73I - 2.2.3.1
PASCAL ?
PLI - 6.10.1, 6.10.2
CS4 + 5.1.1.1
J3 - 2446.8

356 5 accuracy must match also for floating point parameters

CHOL n
IRONMAN - 11B, 11A, 12C, 7G, 3-1C
J73C + (if RESTRICTED)
J73I -
PASCAL ?
PLI -
CS4 -
J3 -

357 6 on writable parameters

CHOL n *
IRONMAN n * [11B, 11A, 12C, 7G, 3-1C]
J73C + (if RESTRICTED)
J73I - 2.2.3.1
PASCAL ?
PLI + 6.10.1
CS4 - 5.1.1.1 (- for COPY, + for REF)
J3 - 2446.8

358 6 on readable parameters

CHOL n *
IRONMAN n * [11B, 11A, 12C, 7G, 3-1C]
J73C + (if RESTRICTED)
J73I - 2.2.3.1
PASCAL ?
PLI - 6.10.1, 6.10.2
CS4 - 5.1.1.1 (- for COPY, + for REF)
J3 - 2446.8

Real Data Type

359 5 accuracy must match for fixed point parameters

CHOL	n
IRONMAN	+ 3-1H, 7G
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	- (fraction only)
J3	-

360 6 on writable parameters

CHOL	n *
IRONMAN	+
J73C	n
J73I	n
PASCAL	n
PLI	+ 6.10.1
CS4	- 5.1.1.1 (- for COPY, + for REF)
J3	- 2446.8

361 6 on readable parameters

CHOL	n *
IRONMAN	+
J73C	n
J73I	n
PASCAL	n
PLI	- 6.10.1, 6.10.2
CS4	- 5.1.1.1 (- for COPY, + for REF)
J3	- 2446.8

362 5 radix point must match for fixed point parameters

CHOL	n
IRONMAN	? 3-1H, 7G, 11B, 11A, 12C
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	n
J3	-

363 6 on writable parameters

CHOL	n *
IRONMAN	?
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	n
J3	- 2446.8

Real Data Type

364 6 on readable parameters

CHOL	n *
IRONMAN	?
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	n
J3	- 2446.8

365 4 inclusion match on range attribute...

CHOL	+
IRONMAN	+ 10B, 13D, 7G, 3-1A (for fixed point only)
J73C	+ (if RESTRICTED)
J73I	-
PASCAL	-
PLI	-
CS4	+
J3	-

366 5 actual input range must be included in formal input range

CHOL	-
IRONMAN	o [10B, 13D, 7G, 3-1A (for fixed point only)]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	- 5.1.1.1, 3.2.2.3.2
J3	-

367 5 formal output range must be included in actual output range

CHOL	-
IRONMAN	o [10B, 13D, 7G, 3-1A (for fixed point only)]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	- 5.1.1.1, 3.2.2.3.2
J3	-

368 5 ranges of inout parameters must match exactly

CHOL	-
IRONMAN	o [10B, 13D, 7G, 3-1A (for fixed point only)]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	+ 5.1.1.1 (REF parameters)
J3	-

Real Data Type

- 369 5 ranges must overlap
- | | |
|---------|--|
| CHOL | + |
| IRONMAN | + 10B, 13B, 3-1F (fixed point only) |
| J73C | + (if RESTRICTED) |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | + 5.1.1.1, 3.2.2.3.2 (COPY parameters) |
| J3 | - |
- 370 5 range exception for parameters
- | | |
|---------|--------------------------------|
| CHOL | + |
| IRONMAN | + 10B, 13D |
| J73C | + |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | + 3.2.2.3.2 (assign exception) |
| J3 | - |
- 371 5 range relationships not considered
- | | |
|---------|-----------------------------------|
| CHOL | - |
| IRONMAN | - 10B, 13D |
| J73C | + (unless RESTRICTED) |
| J73I | + 2.2.3 |
| PASCAL | + 10, 9.1.2, 5.B (no real ranges) |
| PLI | + 6.10 |
| CS4 | - |
| J3 | + 2446.8 |
- 372 4 representational conversion/accuracy preserving
- | | |
|---------|---------------------------------------|
| CHOL | n |
| IRONMAN | ? 3B, 3-1C |
| J73C | + |
| J73I | + |
| PASCAL | ? |
| PLI | + |
| CS4 | + (only single <--> double precision) |
| J3 | + |
- 373 5 permitted for input parameters
- | | |
|---------|-----------------------------|
| CHOL | n * |
| IRONMAN | ? * [3B, 3-1C] |
| J73C | + |
| J73I | + 2.2.3.1 |
| PASCAL | ? |
| PLI | + 6.10.1, 6.10.2 |
| CS4 | + 5.1.1.1 (COPY parameters) |
| J3 | + 2446.8 |

Real Data Type

- 374 5 permitted for output parameters
- | | |
|---------|-----------------------------|
| CHOL | n * |
| IRONMAN | ? * [3B, 3-1C] |
| J73C | + |
| J73I | + 2.2.3.1 |
| PASCAL | ? |
| PLI | - 6.10.1 |
| CS4 | + 5.1.1.1 (COPY parameters) |
| J3 | + 2446.8 |
- 375 4 other safe matches
- | | |
|---------|--------|
| CHOL | - |
| IRONMAN | o [7C] |
| J73C | - |
| J73I | - |
| PASCAL | ? |
| PLI | - |
| CS4 | - |
| J3 | - |
- 376 4 conversion of output parameters (write-only) permitted
- | | |
|---------|-----------------------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | + (unless RESTRICTED) |
| J73I | + 2.2.3.1 |
| PASCAL | n |
| PLI | n 6.10.1 |
| CS4 | - |
| J3 | + 2446.8 |
- 377 4 conversion of input parameters (read-only) permitted
- | | |
|---------|-----------------------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | + (unless RESTRICTED) |
| J73I | + 2.2.3.1 |
| PASCAL | ? |
| PLI | + 6.10.1, 6.10.2 |
| CS4 | - |
| J3 | + 2446.8 |
- 378 4 same conversions as permitted in assignment statements
- | | |
|---------|------------------------------|
| CHOL | + (i.e., none) |
| IRONMAN | + 3B |
| J73C | + (i.e., none if RESTRICTED) |
| J73I | + 2.2.3.1 |
| PASCAL | ? |
| PLI | + 6.10.2 |
| CS4 | + 5.1.1.1 (COPY parameters) |
| J3 | + 2446.8 |

Real Data Type

379 3 function values

CHOL + 1.1.2
IRONMAN + 7D
J73C + 1.1.2
J73I + 2.2.2
PASCAL + 11
PLI + 12.21, 5.4.47, 6.7
CS4 + 5.1
J3 + 2432, 2485

380 3 addition and subtraction

CHOL + 1.1.2
IRONMAN + 3-1B
J73C + 1.1.2
J73I + 4.8, 5.2.2
PASCAL + 8.1.3
PLI + 7.3.1
CS4 + 3.2.2.4.1, 3.2.4.1.1, 3.2.4.2.1
J3 + 2434

381 3 negation

CHOL + 1.1.2
IRONMAN + 3-1B
J73C + 1.1.2
J73I + 4.8
PASCAL + 8.1.3
PLI + 7.3.1
CS4 + 3.2.2.4.1, 3.2.4.1.2
J3 + 2434

382 4 parentheses required

CHOL -
IRONMAN o [3-1B]
J73C -
J73I - 4.8.1
PASCAL - 8
PLI - 7.2
CS4 - 3.2.4
J3 - 2434.2

383 3 multiplication

CHOL + 1.1.2
IRONMAN + 3-1B
J73C + 1.1.2
J73I + 4.8, 5.2.2
PASCAL + 8.1.2
PLI + 7.3.1
CS4 + 3.2.2.4.1, 3.2.4.2.1
J3 + 2434

Real Data Type

384 3 division (floating point result)

CHOL + 1.1.2
IRONMAN + 3-1B
J73C + 1.1.2
J73I + 4.8, 5.2.2
PASCAL + 8.1.2
PLI + 7.3.1, 7.3.1.2.2, 13.2.8
CS4 + 3.2.2.4.1, 3.2.4.2.3
J3 + 2434-5

385 4 parentheses required

CHOL - (change to conform to IRONMAN?)
IRONMAN + 4G
J73C -
J73I - 4.8.1
PASCAL - 8
PLI - 7.2
CS4 - 3.2.4
J3 - 2434.2

386 3 division (fixed point result)

CHOL n
IRONMAN + 3-IH
J73C n
J73I n
PASCAL n
PLI + 7.3.1, 7.3.1.2.2, 13.2.8
CS4 + 3.2.3.4.1, 3.2.4.2.3
J3 + 2434-5

387 4 parentheses required

CHOL n
IRONMAN + 4G
J73C n
J73I n
PASCAL n
PLI - 7.2
CS4 - 3.2.4
J3 - 2434.2

388 3 exponentiation (real result)

CHOL -
IRONMAN - 3-1B
J73C +
J73I + 4.8, 5.2.2
PASCAL -
PLI + 7.3.1.2.2, 7.3.1.2.3
CS4 + 3.2.2.4.1, 3.2.4.2.4
J3 + 2434

Real Data Type

389	4	by multiplication	
		CHOL	n *
		IRONMAN	n * [3-1B]
		J73C	?
		J73I	?
		PASCAL	n
		PLI	-
		CS4	-
		J3	-
390	4	by logarithms (only)	
		CPOL	n *
		IRONMAN	n * [3-1B]
		J73C	?
		J73I	?
		PASCAL	n
		PLI	-
		CS4	-
		J3	-
391	4	by logarithms and multiplication	
		CHOL	n *
		IRONMAN	n * [3-1B]
		J73C	?
		J73I	?
		PASCAL	n
		PLI	+ 7.3.1.2.2, 7.3.1.2.3
		CS4	+ 3.2.4.2.4
		J3	+ 2434
392	4	constant exponent only	
		CHOL	n *
		IRONMAN	n * [3-1B]
		J73C	-
		J73I	-
		PASCAL	n
		PLI	-
		CS4	-
		J3	-
393	4	variable exponent permitted	
		CHOL	n *
		IRONMAN	n * [3-1B]
		J73C	+
		J73I	+ 4.8
		PASCAL	n
		PLI	+ 7.3.1
		CS4	+ 3.2.4
		J3	+

Real Data Type

394 5 result type determined at run-time

CHOL	n *
IRONMAN	n * [3-1B]
J73C	-
J73I	-
PASCAL	n
PLI	-
CS4	-
J3	-

395 5 result type determined at compile-time

CHOL	n *
IRONMAN	n * [3-1B]
J73C	+
J73I	+ 4.8.2
PASCAL	n
PLI	+ 7.3.1.2.2
CS4	+ 3.2.4.2.4
J3	+ 2434.7-.8

396 4 right associative

CHOL	n *
IRONMAN	n * [3-1B]
J73C	-
J73I	-
PASCAL	n
PLI	+ 7.2
CS4	+ 3.2.4
J3	-

397 4 left associative

CHOL	n *
IRONMAN	n * [3-1B]
J73C	+
J73I	+ 4.8.3
PASCAL	n
PLI	-
CS4	-
J3	+ 2434.4

398 4 parentheses required

CHOL	n *
IRONMAN	n * [3-1B]
J73C	-
J73I	- 4.8.1
PASCAL	n
PLI	- 7.2
CS4	- 3.2.4
J3	- 2434.2

Real Data Type

399 3 remainder
CHOL -
IRONMAN + 3-1H (fixed point only)
J73C +
J73I + 4.8, 5.2.2
PASCAL -
PLI -
CS4 -
J3 -

400 3 square root operator
CHOL -
IRONMAN - 3-1B, 3-1H
J73C -
J73I -
PASCAL + 11.1.1
PLI + 13.3
CS4 + 3.2.2.4.4.3
J3 -

401 3 absolute value
CHOL -
IRONMAN - 3-1B
J73C +
J73I + 4.10.7
PASCAL + 11.1.1
PLI + 13.2.1
CS4 + 3.2.2.4.4.1
J3 + 2434.2-.3

402 3 max/min operator...
CHOL -
IRONMAN - 3-1B
J73C -
J73I -
PASCAL -
PLI + 13.2.13, 13.2.14
CS4 -
J3 -

403 4 only two values
CHOL n *
IRONMAN n * [3-1B]
J73C n
J73I n
PASCAL n
PLI -
CS4 n
J3 n

Real Data Type

404 4 more than two values

CHOL	n *
IRONMAN	n * [3-1B]
J73C	n
J73I	n
PASCAL	n
PLI	+ 13.2.13, 13.2.14
CS4	n
J3	n

405 3 special real operators

CHOL	-
IRONMAN	- 3-1B
J73C	-
J73I	-
PASCAL	+
PLI	+
CS4	+
J3	-

406 4 trigonometric functions

CHOL	n *
IRONMAN	n * 3-1B
J73C	n *
J73I	-
PASCAL	+ 11.1.1 (sin, cos)
PLI	+ 13.3
CS4	+ C
J3	-

407 4 inverse trigonometric functions

CHOL	n *
IRONMAN	n * 3-1B
J73C	n *
J73I	-
PASCAL	+ 11.1.1 (arctan)
PLI	+ 13.3
CS4	+ C
J3	-

408 4 hyperbolic functions and inverses

CHOL	n *
IRONMAN	n * 3-1B
J73C	n *
J73I	-
PASCAL	-
PLI	+ 13.3
CS4	+ C
J3	-

Real Data Type

409 4 logarithms and exponentiation (base 10 and natural)

CHOL	n *
IRONMAN	n * 3-1B
J73C	n *
J73I	-
PASCAL	+ 11.1.1 (natural)
PLI	+ 13.3
CS4	+ C
J3	-

410 4 random number generators

CHOL	n *
IRONMAN	n * 3-1B (also for integer)
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

411 3 relational operators...

CHOL	+
IRONMAN	. 3-1B
J73C	+
J73I	+ 4.6, 5.2.2
PASCAL	+
PLI	+ 7.3.4
CS4	+ 3.2.2.4.2
J3	+ 2437-9

412 4 equality/inequality (exact)

CHOL	+
IRONMAN	+ 3-1B
J73C	+
J73I	+ 4.6, 5.2.2
PASCAL	+ 8.1.4
PLI	+ 7.3.4
CS4	+ 3.2.2.4.2
J3	+ 2438 (floating)

413 4 equality/inequality (approximate)

CHOL	-
IRONMAN	- 3-1B
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	+ 3.2.2.4.2
J3	+

Real Data Type

414 5 minimum accuracy of operands

CHOL	n *
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	-
J3	+ 2438 (fixed vs. fixed)

415 5 maximum accuracy of operands

CHOL	n *
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	-
J3	+ 2438 (integer vs. fixed)

416 5 accuracy is programmer specified

CHOL	n *
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	+ 3.2.2.4.2
J3	-

417 4 algebraic comparisons

CHOL	+
IRONMAN	+ 3-1B
J73C	+
J73I	+ 4.6, 5.2.2
PASCAL	+ 8.1.4
PLI	+ 7.3.4
CS4	+ 3.2.2.4.2
J3	+ 2437

418 4 chained comparisons

CHOL	o
IRONMAN	o 3-1B, 6C (range checks in case statements)
J73C	-
J73I	-
PASCAL	- 8
PLI	-
CS4	-
J3	+ 2439

Real Data Type

419 4 partitioning

CHOL	-
IRONMAN	o [3-1B]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

420 4 implicit conversion permitted from integer to real

CHOL	-
IRONMAN	- 3-1H
J73C	+ (unless RESTRICTED)
J73I	+ 4.6, 1.7
PASCAL	?
PLI	+ 7.3.4.1
CS4	-
J3	+ 2438

421 3 assignment to real

CHOL	+
IRONMAN	+ 5F
J73C	+
J73I	+ 3.3
PASCAL	+ 9.1.1
PLI	+ 12.2
CS4	+ 4.2, 3.2.2.3.2, 3.2.3.3.2
J3	+ 2442

422 4 exact match on type

CHOL	+
IRONMAN	+ 3B, 3-1H
J73C	+ (if RESTRICTED)
J73I	- 3.3, 1.7
PASCAL	- 9.1.1
PLI	- 12.2
CS4	+ 4.2, 3.2.2.3.2
J3	- 2442.3

423 5 size must match also for floating point assignment

CHOL	n
IRONMAN	- 3-1C, 3B
J73C	+ (if RESTRICTED)
J73I	- 1.7.2.3
PASCAL	+ 9.1.1 (is only one)
PLI	- 12.2
CS4	- 3.2.2.3.2
J3	- 2442.3

Real Data Type

- 424 5 size must match also for fixed point assignment
- | | |
|---------|-------------|
| CHOL | n |
| IRONMAN | - 3-1H, 3B |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | - 12.2 |
| CS4 | - 3.2.3.3.2 |
| J3 | - 2442.3 |
- 425 5 radix point must match also for fixed point assignment
- | | |
|---------|------------------------------------|
| CHOL | n |
| IRONMAN | - 3-1H, 11A, 12C, 3B, 11B, 12C, 3B |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | n |
| CS4 | n |
| J3 | - 2442.3 |
- 426 4 inclusion match on range attribute
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | o [5F] |
| J73C | + (if RESTRICTED) |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | + |
| J3 | - 2442 |
- 427 5 source range must be included in target range
- | | |
|---------|--------|
| CHOL | - |
| IRONMAN | o [5F] |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 428 5 ranges must match exactly
- | | |
|---------|--------|
| CHOL | - |
| IRONMAN | o [5F] |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |

Real Data Type

- 429 5 ranges must overlap
- | | |
|---------|--|
| CHOL | + |
| IRONMAN | + 10B, 13D, 3-1F (fixed point only; value must be in target range) |
| J73C | + (if RESTRICTED) |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | + 3.2.2.3.2 (floating) |
| J3 | - |
- 430 5 range relationships not considered
- | | |
|---------|------------------------|
| CHOL | - |
| IRONMAN | - 10B, 13D |
| J73C | + (unless RESTRICTED) |
| J73I | + 3.3 |
| PASCAL | + 9.1.1 |
| PLI | + 12.2 |
| CS4 | + 3.2.3.3.2 (fraction) |
| J3 | + 2442 |
- 431 4 implicit conversion from character
- | | |
|---------|---------------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | - |
| J73I | - 3.3, 1.7 |
| PASCAL | - |
| PLI | + 8.2.3, 12.2 |
| CS4 | - 4.2 |
| J3 | - |
- 432 4 implicit conversion from integer
- | | |
|---------|-----------------------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | + (unless RESTRICTED) |
| J73I | + 3.3, 1.7 |
| PASCAL | + 9.1.1 |
| PLI | + 8.2.10, 12.2 |
| CS4 | - 4.2 |
| J3 | + 2442 |

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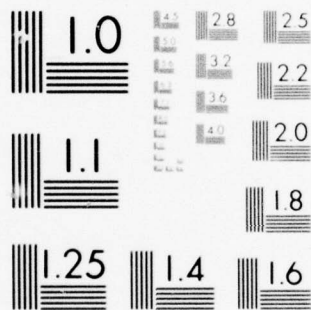
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Real Data Type

- 433 5 only if exact
- | | |
|---------|--------|
| CHOL | n * |
| IRONMAN | n * 3B |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | n |
| J3 | - |
- 434 5 approximation is permitted
- | | |
|---------|-----------------------|
| CHOL | n * |
| IRONMAN | n * 3B |
| J73C | + (unless RESTRICTED) |
| J73I | + |
| PASCAL | + 9.1.1 |
| PLI | + 8.2.10, 12.2 |
| CS4 | n |
| J3 | + 2442 |
- 435 5 only for literals
- | | |
|---------|------|
| CHOL | n * |
| IRONMAN | + 4E |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | n |
| J3 | - |
- 436 4 implicit conversion from real
- | | |
|---------|--|
| CHOL | + |
| IRONMAN | + 3-1C (but not for fixed point; 3-1H, 3-1E) |
| J73C | + |
| J73I | + 3.3, 1.7 |
| PASCAL | + |
| PLI | + 8.2.10, 12.2 |
| CS4 | + |
| J3 | + 2442 |
- 437 5 accuracy-preserving
- | | |
|---------|--|
| CHOL | + (only one real representation) |
| IRONMAN | + 3-1C (but not for fixed point; 3-1H, 3-1E) |
| J73C | - |
| J73I | - |
| PASCAL | + 9.1.1 (only one real representation) |
| PLI | - |
| CS4 | + 3.2.2.3.2 |
| J3 | - |

Real Data Type

- 438 5 accuracy-impairing
- CHOL -
 - IRONMAN + 3-1C (but not for fixed point; 3-1H, 3-1E)
 - J73C +
 - J73I + 1.7
 - PASCAL -
 - PLI + 7.3.1.2
 - CS4 +
 - J3 +
- 439 6 by truncation
- CHOL n *
 - IRONMAN o [3-1C (but not for fixed point; 3-1H, 3-1E)]
 - J73C -
 - J73I -
 - PASCAL n
 - PLI + 7.3.1.2 (fixed point)
 - CS4 -
 - J3 -
- 440 7 of most significant bits is possible
- CHOL n *
 - IRONMAN - 3-1A
 - J73C n
 - J73I n
 - PASCAL n
 - PLI - (size or fixedoverflow condition raised)
 - CS4 n
 - J3 n
- 441 7 of least significant bits is possible
- CHOL n *
 - IRONMAN o 3-1C (but not for fixed point; 3-1H, 3-1E)
 - J73C n
 - J73I n
 - PASCAL n
 - PLI + 7.3.1.2
 - CS4 n
 - J3 n
- 442 6 by rounding
- CHOL n *
 - IRONMAN o [3-1C (but not for fixed point; 3-1H, 3-1E)]
 - J73C -
 - J73I -
 - PASCAL n
 - PLI + 7.3.1.2
 - CS4 + 3.2.2.3.2
 - J3 -

Real Data Type

- 443 7 for floating point only
- | | |
|---------|------------------------|
| CHOL | n * |
| IRONMAN | + 3-1C |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | + 7.3.1.2 |
| CS4 | + 3.2.2.3.2, 3.2.3.3.2 |
| J3 | n |
- 444 6 rounding/truncation implementation-dependent
- | | |
|---------|-------------|
| CHOL | n * |
| IRONMAN | + 3-1C, 13F |
| J73C | - |
| J73I | - |
| PASCAL | n |
| PLI | - |
| CS4 | - |
| J3 | - |
- 445 7 determinable by environmental enquiry
- | | |
|---------|-------------|
| CHOL | n * |
| IRONMAN | + 11C, 3-1C |
| J73C | n * |
| J73I | - |
| PASCAL | n |
| PLI | - |
| CS4 | - |
| J3 | - |
- 446 6 rounding/truncation depends on target variable
- | | |
|---------|------------------------|
| CHOL | n * |
| IRONMAN | - 3-1C |
| J73C | + |
| J73I | + 2.1.3 |
| PASCAL | n |
| PLI | - |
| CS4 | - |
| J3 | + 2463.1-.2, 2463.6-.8 |
- 447 4 implicit conversion from bit
- | | |
|---------|-----------------------|
| CHOL | - |
| IRONMAN | n 3B |
| J73C | + (unless RESTRICTED) |
| J73I | + 3.3, 1.7 |
| PASCAL | n |
| PLI | + 8.2.5, 12.2 |
| CS4 | n |
| J3 | n |

Real Data Type

448 4 implicit conversion from other to real

CHOL	-
IRONMAN	- 3B
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	- 4.2
J3	-

449 3 expression evaluation...

CHOL	o [1.1.2]
IRONMAN	o [3-1A]
J73C	o [1.1.2]

450 4 implied result accuracy (not analyzed)

CHOL	o
IRONMAN	o 3-1C
J73C	?
J73I	? 4.8
PASCAL	+
PLI	+
CS4	+
J3	+

451 5 depends on target accuracy/range

CHOL	o
IRONMAN	o [3-1C]
J73C	-
J73I	-
PASCAL	?
PLI	-
CS4	-
J3	-

452 5 depends on operand accuracy/range

CHOL	o
IRONMAN	o [3-1C]
J73C	?
J73I	?
PASCAL	?
PLI	+ 7.3.1.1
CS4	+ 3.2.4
J3	+ 2434.6, 2435

Real Data Type

453 5 accuracy defining operators available

CHOL	-
IRONMAN	+ 3-1H
J73C	-
J73I	-
PASCAL	-
PLI	+ 13.2.2, 13.2.8, 13.2.16, 13.2.21, 13.2.17
CS4	-
J3	-

454 4 result approximation methods

CHOL	o
IRONMAN	o [3-1A]
J73C	?
J73I	? 4.8, 1.7, 2.1.3.2
PASCAL	? 8

455 5 by truncation

CHOL	o
IRONMAN	o [3-1A]
J73C	?
J73I	?
PASCAL	?
PLI	+ 7.3.1.2, 7.3.1.2.2 (fixed point)
CS4	? 3.2.4
J3	+ 2435 (fixed)

456 6 of most significant bits is possible

CHOL	-
IRONMAN	- 3-1A
J73C	?
J73I	?
PASCAL	?
PLI	-
CS4	-
J3	+ 2435.1

457 6 of least significant bits is possible

CHOL	o
IRONMAN	+ 3-1C (but not for fixed point; 3-1H)
J73C	?
J73I	?
PASCAL	?
PLI	+ 7.3.1.2, 7.3.1.2.2
CS4	+ 3.2.4
J3	+ 2435.1

Real Data Type

458 5 by rounding

CHOL	o (probably should be required)
IRONMAN	o [3-1A]
J73C	?
J73I	?
PASCAL	?
PLI	+ 7.3.1.2
CS4	-
J3	-

459 6 implicit rounding for floating point

CHOL	o
IRONMAN	o 3-1C
J73C	?
J73I	?
PASCAL	?
PLI	+ 7.3.1.2
CS4	-
J3	-

460 6 implicit rounding for fixed point

CHOL	n
IRONMAN	- 3-1H
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	-
J3	-

461 5 rounding/truncation is implementation dependent

CHOL	o
IRONMAN	+ 3-1C
J73C	+
J73I	+ 4.8
PASCAL	+ 8
PLI	-
CS4	+ 3.2.4
J3	+ 2434 (floating)

462 6 determinable by environmental enquiry

CHOL	o
IRONMAN	+ 11C, 3-1C
J73C	o
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

Real Data Type

463 5 rounding/truncation depends on operand attributes

CHOL	o
IRONMAN	- 3-1C
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

464 4 implicit conversion of operands...

CHOL	-
IRONMAN	o [3-1A]
J73C	+ (unless RESTRICTED)
J73I	+
PASCAL	+ 8
PLI	+
CS4	+
J3	+ 2434.6, 2435

465 5 as in assignment statements

CHOL	+ (i.e., none)
IRONMAN	+ 3B
J73C	+ (i.e., none if RESTRICTED)
J73I	+ 1.7, 4.8, 3.3
PASCAL	+ 8, 9.1.1
PLI	+ 7.3.1.1, 12.2
CS4	-
J3	+ 2442.3

466 5 not as in assignment statements

CHOL	n *
IRONMAN	- 3B
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	+ 3.2.4, 4.2 (integer to real permitted)
J3	-

467 4 evaluation order of operands...

CHOL	o [1.1.2]
IRONMAN	o [3-1A]
J73C	o [1.1.2]
J3	2490-4

Real Data Type

- 468 5 strictly left-to-right
- CHOL -
 - IRONMAN - 4C, 1D
 - J73C -
 - J73I -
 - PASCAL -
 - PLI -
 - CS4 + 3.0
 - J3 + 2431, 2434.4, 2442.3
- 469 5 left-to-right within equal precedence
- CHOL -
 - IRONMAN - 4C, 1D
 - J73C -
 - J73I -
 - PASCAL -
 - PLI -
 - CS4 -
 - J3 -
- 470 5 order not specified
- CHOL +
 - IRONMAN + 4C, 1D, 10E
 - J73C +
 - J73I + 4.8.3
 - PASCAL + 8
 - PLI + 7.1.4
 - CS4 -
 - J3 -
- 471 3 constant expression evaluation
- CHOL +
 - IRONMAN + 4E
 - J73C +
 - J73I -
 - PASCAL -
 - PLI -
 - CS4 + 7.1
 - J3 -
- 472 4 with target machine accuracy and range
- CHOL +
 - IRONMAN + 13F, 1G, 4E
 - J73C + (if RESTRICTED)
 - J73I -
 - PASCAL -
 - PLI -
 - CS4 ?
 - J3 -

Real Data Type

473 4 applied to the basic operators: + - * /

CHOL	+
IRONMAN	+ 4E, 3-1B, 3-1H
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	+ 7.1
J3	-

474 4 exponentiation

CHOL	n
IRONMAN	n 3-1B
J73C	+
J73I	-
PASCAL	n
PLI	-
CS4	+ 7.1
J3	-

475 4 remainder

CHOL	n
IRONMAN	+ 3-1H, 4E
J73C	+
J73I	-
PASCAL	n
PLI	n
CS4	n
J3	n

476 4 square root

CHOL	n
IRONMAN	n 3-1B
J73C	n
J73I	n
PASCAL	-
PLI	-
CS4	-
J3	n

477 4 absolute value

CHOL	n
IRONMAN	n 3-1B
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

Real Data Type

478 4	max/min	
	CHOL	n
	IRONMAN	n 3-1B
	J73C	n
	J73I	n
	PASCAL	n
	PLI	-
	CS4	n
	J3	n
479 4	trigonometric functions and logarithms	
	CHOL	n
	IRONMAN	n 3-1B
	J73C	n
	J73I	n
	PASCAL	-
	PLI	-
	CS4	-
	J3	n
480 4	conversions	
	CHOL	+
	IRONMAN	o [4E]
	J73C	+
	J73I	-
	PASCAL	-
	PLI	-
	CS4	+
	J3	-
481 5	implicit	
	CHOL	n
	IRONMAN	+ 3-1C, 4E (for floating point)
	J73C	+
	J73I	-
	PASCAL	-
	PLI	-
	CS4	n
	J3	-
482 5	explicit	
	CHOL	+
	IRONMAN	+ 3-1H, 4E (for fixed point)
	J73C	+
	J73I	-
	PASCAL	n
	PLI	-
	CS4	+ 7.1
	J3	n

Real Data Type

483 4 relational operators

CHOL	+
IRONMAN	+ 3-1B, 6C, 4E
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	+ 7.1
J3	-

484 4 programmer-defined functions

CHOL	-
IRONMAN	o [4E]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

485 4 implicit conversion for constants only (by rounding)

CHOL	- (perhaps o)
IRONMAN	o [4E]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	- (partly, see 2464.2)

486 3 explicit conversion to real...

CHOL	+
IRONMAN	o [3-1A]
J73C	+
J73I	+ 1.7
PASCAL	-
PLI	+
CS4	+
J3	-

487 4 accuracy defining conversions on data...

CHOL	o
IRONMAN	. 3-1C, 3-1H
J73C	o
J73I	-
PASCAL	-
PLI	+
CS4	+
J3	-

Real Data Type

488	5	round and truncate
		CHOL o
		IRONMAN o [3-1C, 3-1H]
		J73C o
		J73I -
		PASCAL -
		PLI + 13.2.19, 13.2.17
		CS4 + (round only)
		J3 -
489	6	specified accuracy required
		CHOL -
		IRONMAN o [3-1C, 3-1H]
		J73C -
		J73I n
		PASCAL n
		PLI + 13.2.19, 13.2.17
		CS4 + 3.2.2.4.3
		J3 n
490	6	specified accuracy optional
		CHOL -
		IRONMAN o [3-1C, 3-1H]
		J73C -
		J73I n
		PASCAL n
		PLI -
		CS4 -
		J3 n
491	6	specified accuracy always implicit
		CHOL +
		IRONMAN o [3-1C, 3-1H]
		J73C +
		J73I n
		PASCAL n
		PLI -
		CS4 -
		J3 n
492	5	widening operations
		CHOL + (FLOAT operator)
		IRONMAN o [3-1C, 3-1H]
		J73C + (FLOAT operator)
		J73I -
		PASCAL -
		PLI + 13.2.17
		CS4 +
		J3 -

Real Data Type

- 493 6 via round/truncate
- | | |
|---------|----------------|
| CHOL | o |
| IRONMAN | o [3-1C, 3-1H] |
| J73C | o |
| J73I | - |
| PASCAL | - |
| PLI | + 13.2.19 |
| CS4 | + 3.2.2.4.3 |
| J3 | - |
- 494 6 via special operators
- | | |
|---------|----------------|
| CHOL | o |
| IRONMAN | o [3-1C, 3-1H] |
| J73C | o |
| J73I | - |
| PASCAL | - |
| PLI | + 13.2.17 |
| CS4 | - |
| J3 | - |
- 495 4 accuracy defining arithmetic operators
- | | |
|---------|--------------|
| CHOL | - |
| IRONMAN | ? 3-1C, 3-1H |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | + |
| CS4 | - |
| J3 | - |
- 496 5 division
- | | |
|---------|----------|
| CHOL | n * |
| IRONMAN | ? 3-1H |
| J73C | n * |
| J73I | - |
| PASCAL | - |
| PLI | + 13.2.8 |
| CS4 | - |
| J3 | - |
- 497 5 multiplication, addition, subtraction
- | | |
|---------|----------------------------|
| CHOL | n * |
| IRONMAN | ? 3-1H |
| J73C | n * |
| J73I | - |
| PASCAL | - |
| PLI | + 13.2.16, 13.2.2, 13.2.21 |
| CS4 | - |
| J3 | - |

Real Data Type

498 5 rounding/truncation implied as for expression evaluation

CHOL	n
IRONMAN	? * [3-1C, 3-1H]
J73C	n
J73I	n
PASCAL	n
PLI	+ 7.3.1.2
CS4	n
J3	n

499 5 rounding/truncation explicitly specifiable

CHOL	n
IRONMAN	? * [3-1C, 3-1H]
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

500 4 explicitly convertible data types...

CHOL	o
IRONMAN	o [3-1A]
J73C	o
PASCAL	-
J3	-

501 5 integers

CHOL	+
IRONMAN	+ 3-1B
J73C	+
J73I	+ 1.7.1.2.3
PASCAL	-
PLI	+ 13.2.9, 13.2.10
CS4	+ 3.2.2.4.3
J3	-

502 5 representational conversions (real to real)

CHOL	- (only one real representation)
IRONMAN	o [3-1A]
J73C	+
J73I	+ 1.7.1.2.3
PASCAL	- (only one real representation)
PLI	+ 13.2.9, 13.2.10
CS4	+ (rounding only)
J3	-

Real Data Type

503 6 rounding/truncation as for assignment

CHOL	n
IRONMAN	o [3-1A]
J73C	?
J73I	?
PASCAL	n
PLI	+ 13.2.9, 13.2.10, 7.3.1.2
CS4	+ 3.2.2.4.3, 3.2.3.4.3
J3	n

504 6 rounding/truncation explicitly specifiable

CHOL	n
IRONMAN	o [3-1A]
J73C	-
J73I	-
PASCAL	n
PLI	+ 13.2.19, 13.2.17
CS4	-
J3	n

505 7 required for fixed point

CHOL	n
IRONMAN	+ 3-1H
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	-
J3	n

506 7 performable beyond specified accuracy for floating point

CHOL	n
IRONMAN	+ 3-1C
J73C	n
J73I	n
PASCAL	n
PLI	- 13.2.19
CS4	-
J3	n

Real Data Type

507 5	character	
	CHOL	+ (For input conversions)
	IRONMAN	+ 4B, 2G (to ensure program/data literals are converted equivalently)
	J73C	+ (for input conversions, also UNSPEC to integer to float)
	J73I	+ 1.7.1.2.3 (UNSPEC to integer to float)
	PASCAL	-
	PLI	+ 13.2.9, 13.2.10
	CS4	+ 3.2.2.4.3, 3.2.3.4.3
	J3	-
508 5	bit	
	CHOL	+
	IRONMAN	o [3-1A]
	J73C	+
	J73I	+ 1.7.1.2.3
	PASCAL	n
	PLI	+ 13.2.9, 13.2.10
	CS4	n
	J3	n
509 5	other	
	CHOL	-
	IRONMAN	? 4B
	J73C	-
	J73I	-
	PASCAL	-
	PLI	-
	CS4	-
	J3	-
510 3	scale operator for fixed point data	
	CHOL	n
	IRONMAN	+ 3-1H
	J73C	n
	J73I	n
	PASCAL	n
	PLI	-
	CS4	-
	J3	-

Real Data Type

511 3 exception conditions

CHOL	+
IRONMAN	o [3-1A]
J73C	+
J73I	+
PASCAL	-
PLI	+
CS4	+
J3	-

512 4 overflow

CHOL	+
IRONMAN	+ 3-1A
J73C	+
J73I	-
PASCAL	-
PLI	+ 10.4.7, 10.4.10, 10.4.12
CS4	+
J3	-

513 5 addition and subtraction

CHOL	+
IRONMAN	+ 3-1A
J73C	+
J73I	-
PASCAL	-
PLI	+ 10.4.7, 10.4.10, 10.4.12
CS4	+ 3.2.4.2.1
J3	- 2435

514 5 multiplication and division

CHOL	+
IRONMAN	+ 3-1A
J73C	+
J73I	-
PASCAL	-
PLI	+ 10.4.7, 10.4.10, 10.4.12
CS4	+ 3.2.4.2.1, 3.2.4.2.3
J3	- 2435

515 5 exponentiation

CHOL	n
IRONMAN	n
J73C	+
J73I	-
PASCAL	n
PLI	+ 10.4.7, 10.4.10, 10.4.12
CS4	+ 3.2.4.2.4
J3	-

Real Data Type

516 5	conversion	
	CHOL	+
	IRONMAN	+ 3-1A
	J73C	+
	J73I	-
	PASCAL	-
	PLI	+ 10.4.12
	CS4	+ 3.2.2.4.3
	J3	-
517 4	zero divide	
	CHOL	+
	IRONMAN	+ 3-1A
	J73C	+
	J73I	-
	PASCAL	-
	PLI	+ 10.4.20
	CS4	+ 3.2.4.2.3
	J3	- 2434.4, 2435
518 4	logarithm of negative base	
	CHOL	n
	IRONMAN	n 3-1B (exponentiation not supported)
	J73C	+
	J73I	-
	PASCAL	-
	PLI	+ 7.3.1.2.3
	CS4	+ 3.2.4.2.4
	J3	- 2434.4
519 4	underflow	
	CHOL	+
	IRONMAN	o [3-1A]
	J73C	+
	J73I	-
	PASCAL	-
	PLI	+ 10.4.19
	CS4	+
	J3	-
520 5	multiplication	
	CHOL	+
	IRONMAN	o [3-1A]
	J73C	+
	J73I	-
	PASCAL	-
	PLI	+ 10.4.19
	CS4	?
	J3	-

Real Data Type

521 5	division	
	CHOL	+
	IRONMAN	o [3-1A]
	J73C	+
	J73I	-
	PASCAL	-
	PLI	+ 10.4.19
	CS4	+ 3.2.4.2.3
	J3	-
522 5	exponentiation	
	CHOL	n
	IRONMAN	n 3-1B (exponentiation not supported)
	J73C	+
	J73I	-
	PASCAL	n
	PLI	+ 10.4.19
	CS4	?
	J3	-
523 4	range (on assignment)	
	CHOL	+
	IRONMAN	+ 10B, 13D
	J73C	+ (if RESTRICTED)
	J73I	-
	PASCAL	-
	PLI	-
	CS4	+ 3.2.2.3.2
	J3	-
524 4	conversion error (ill formed number)	
	CHOL	+
	IRONMAN	+ 10B
	J73C	+
	J73I	+ 1.7.1 (go to an error label)
	PASCAL	-
	PLI	+ 10.4.2
	CS4	+ 3.2.2.4.3
	J3	-
525 4	sqrt exception	
	CHOL	n
	IRONMAN	n 3-1B, 3-1H
	J73C	-
	J73I	-
	PASCAL	-
	PLI	+ 13.3 (error condition)
	CS4	+ 3.2.2.4.4.3
	J3	-

Status Data Type

526 2 Status Data Type

CHOL	+ 1.1.5
IRONMAN	+ 3-2A
J73C	+ 1.1.5
J73I	+
PASCAL	+ 6.1.1
PLI	-
CS4	+ 3.3
J3	+

527 3 is declared/represented as integer

CHOL	-
IRONMAN	- 3-2A
J73C	+ (unless RESTRICTED)
J73I	+ 2.4
PASCAL	- 6.1.1
CS4	- 3.3.1
J3	- 2422.4, 2463.13

528 3 programmer definable status value representation

CHOL	+
IRONMAN	+ 11A, 12C
J73C	+
J73I	+ 2.4
PASCAL	-
CS4	-
J3	- 2419.8

529 3 unordered value set permitted

CHOL	+ 1.1.5
IRONMAN	+ 3-2B
J73C	+ 1.1.5
J73I	-
PASCAL	- 8.1.4, 6.1.1
CS4	-
J3	-

530 3 ordered value set permitted

CHOL	+ 1.1.5
IRONMAN	+ 3-2B
J73C	+ 1.1.5
J73I	+ 2.4
PASCAL	+ 8.1.4, 6.1.1
CS4	+ 3.3.1
J3	+ 2419.8, 2437.2

Status Data Type

531 3 subranges of status values

CHOL	+
IRONMAN	+ 3-2B, 3-3D (subranges of enumeration types can serve as array indices)
J73C	+
J73I	-
PASCAL	+ 6.1.3
CS4	-
J3	-

532 4 forms a new type

CHOL	-
IRONMAN	? 3-3D, 3-2B
J73C	-
J73I	n
PASCAL	- 6.1.3, U5.B
CS4	n
J3	n

533 3 constants

CHOL	+
IRONMAN	o [3-2A]
J73C	+
J73I	+
PASCAL	+
CS4	+
J3	+

534 4 literals

CHOL	+
IRONMAN	+ 3-2A
J73C	+
J73I	+ 2.4
PASCAL	+ 6.1.1
CS4	+ 1.3.2.5
J3	+

535 5 lexically distinguished from other identifiers

CHOL	+
IRONMAN	+ 3-2A
J73C	+
J73I	+ 2.4
PASCAL	- 6.1.1
CS4	+ 1.3.2.5
J3	+ 2418.11

Status Data Type

536 5 duplicate status value names permitted

CHOL	+
IRONMAN	+ 3-2A (different sets of character literals)
J73C	+
J73I	+ 2.4
PASCAL	- 4, 5.A
CS4	+ 3.3.1
J3	+ 2418.11

537 6 conversion operator to resolve ambiguities

CHOL	+ (Some form of qualification)
IRONMAN	+ 4B
J73C	+ (some form of qualification)
J73I	+ 2.4 (qualified status constants)
PASCAL	n
CS4	-
J3	- (restricted usage prevents ambiguities)

538 4 mnemonic names can be specified

CHOL	+
IRONMAN	+ 5A
J73C	+
J73I	-
PASCAL	? 5, 6.1.1
CS4	+ 2.3
J3	-

539 5 run-time values permitted

CHOL	+
IRONMAN	+ 5A
J73C	+
J73I	n
PASCAL	- 5
CS4	+ 2.3
J3	n

540 3 variables

CHOL	+
IRONMAN	+ 5B
J73C	+
J73I	- 4.11, 2.1.3, 2.1.4
PASCAL	+ 7
CS4	+ 2.3
J3	+ 2422, 2463.13, 2464

Status Data Type

541 4 read-only access specifiable (in a subscope)

CHOL	+
IRONMAN	o 3-5B
J73C	+
J73I	n
PASCAL	-
CS4	-
J3	-

542 4 NULL value specifiable

CHOL	-
IRONMAN	o [5B]
J73C	-
J73I	n
PASCAL	-
CS4	-
J3	-

543 4 undefined value exists

CHOL	-
IRONMAN	o [5B]
J73C	-
J73I	n
PASCAL	-
CS4	+ 2.3.2, 3.3.3,4
J3	-

544 5 is specifiable

CHOL	n
IRONMAN	o [5B]
J73C	n
J73I	n
PASCAL	n
CS4	-
J3	n

545 3 parameter usage permitted

CHOL	+
IRONMAN	+ 7G
J73C	+
J73I	- 2.2
PASCAL	+ 10, 9.1.2, 11, 8.2
CS4	+ 5.1.1
J3	+ 2446, 2484

Status Data Type

546 4 exact match required (same subranges)

CHOL -
IRONMAN o 3-2B, 7G
J73C -
J73I n
PASCAL ?
CS4 + 5.1.1.1
J3 + 2446.8, 2442.5

547 4 safe match permitted

CHOL +
IRONMAN ? 3-2B, 7G
J73C +
J73I n
PASCAL ?
CS4 + 5.1.1.1., 3.3.3.2
J3 -

548 3 function value

CHOL +
IRONMAN + 7D
J73C +
J73I - 2.2.2
PASCAL + 11
CS4 + 5.1
J3 + 2432, 2485

549 3 operations on ordered value sets

CHOL +
IRONMAN . 3-2B
J73C +
J73I +
PASCAL +
CS4 +
J3 +

550 4 comparison operations permitted

CHOL +
IRONMAN + 3-2B
J73C +
J73I + 2.4, 4.6
PASCAL + 8.1.4
CS4 + 3.3.4.2
J3 + 2437.2, 2439.1

Status Data Type

- 551 4 successor operation is defined
- | | |
|---------|-------------|
| CHOL | + |
| IRONMAN | o [3-2B] |
| J73C | + |
| J73I | - |
| PASCAL | + 6.1.1 |
| CS4 | + 3.3.4.1.1 |
| J3 | - |
- 552 4 predecessor operation is defined
- | | |
|---------|-------------|
| CHOL | + |
| IRONMAN | o [3-2B] |
| J73C | + |
| J73I | - |
| PASCAL | + 6.1.1 |
| CS4 | + 3.3.4.1.2 |
| J3 | - |
- 553 4 ordering with programmer-defined representation...
- | | |
|---------|----------|
| CHOL | o |
| IRONMAN | o [3-2B] |
| J73C | o |
| PASCAL | - |
| CS4 | - |
| J3 | - |
- 554 5 ordering is forbidden
- | | |
|---------|---|
| CHOL | - |
| IRONMAN | - 3-2B, 11A (ordering is "automatically defined") |
| J73C | - |
| J73I | - |
| PASCAL | n |
| CS4 | n |
| J3 | n |
- 555 5 programmer-defined relational and successor operations
- | | |
|---------|---|
| CHOL | - (Ordering is inherited from specified value) |
| IRONMAN | - 3-2B, 11A (ordering is "automatically defined") |
| J73C | - (ordering is inherited from specified value) |
| J73I | - |
| PASCAL | n |
| CS4 | n |
| J3 | n |

Status Data Type

556 3	relational operations...
	CHOL + 1.1.5
	IRONMAN o [3-2A]
	J73C + 1.1.5
	J73I +
	PASCAL + 8.1.4
	CS4 + 3.3.4.2
	J3 +
557 4	equality/inequality
	CHOL + 1.1.5
	IRONMAN + 3-2A
	J73C + 1.1.5
	J73I + 4.6, 5.2.2, 2.4
	PASCAL + 8.1.4
	CS4 + 3.3.4.2
	J3 + 2437.2, 2439.1
558 4	less than, greater than, etc.
	CHOL + 1.1.5
	IRONMAN + 3-2B
	J73C + 1.1.5
	J73I + 4.6, 5.2.2, 2.4
	PASCAL + 8.1.4
	CS4 + 3.3.4.2
	J3 + 2437.2, 2439.1
559 5	on ordered value sets only
	CHOL +
	IRONMAN + 3-2B
	J73C +
	J73I +
	PASCAL + 8.1.4
	CS4 + 3.3.4.2
	J3 +
560 4	restricted to same type
	CHOL +
	IRONMAN o 3-2A, 3-2B
	J73C + (if RESTRICTED)
	J73I - 2.4
	PASCAL + 8.1.4
	CS4 + 3.3.4.2
	J3 ? 2437.2

Status Data Type

561 3 assignment

CHOL +
IRONMAN + 5F
J73C +
J73I ~ 3.3
PASCAL + 9.1.1
CS4 + 4.2, 3.3.3.2
J3 + 2442

562 4 type checked

CHOL +
IRONMAN + 3B
J73C +
J73I n
PASCAL + 9.1.1
CS4 + 4.2, 3.3.3.2
J3 ? 2442.5

563 4 not type checked

CHOL -
IRONMAN - 3B
J73C -
J73I n
PASCAL -
CS4 -
J3 ? 2437.2

564 4 subrange assignment

CHOL +
IRONMAN + 3-2B (if subranges are permitted)
J73C +
J73I n
PASCAL + 9.1.1
CS4 -
J3 -

565 5 range checked

CHOL +
IRONMAN + 10B, 13D
J73C +
J73I n
PASCAL - 9.1.1
CS4 n
J3 n

Status Data Type

566 6	compile-time	
	CHOL	+ (if possible)
	IRONMAN	+ 10B, 13D
	J73C	+ (if possible)
	J73I	n
	PASCAL	n
	CS4	n
	J3	n
567 6	run-time	
	CHOL	+
	IRONMAN	+ 10B, 13D (if successor operation is provided)
	J73C	+
	J73I	n
	PASCAL	n
	CS4	n
	J3	n
568 7	optional	
	CHOL	+
	IRONMAN	+ 10B
	J73C	+
	J73I	n
	PASCAL	+ 14.B (in PASCAL 6000-3.4)
	CS4	n
	J3	n
569 7	exception condition	
	CHOL	+
	IRONMAN	+ 10B, 13D
	J73C	+
	J73I	n
	PASCAL	n
	CS4	n
	J3	n
570 4	implicit conversion from integer values	
	CHOL	-
	IRONMAN	- 3B
	J73C	-
	J73I	n
	PASCAL	-
	CS4	-
	J3	-

Status Data Type

571 3 expression evaluation...

CHOL	o [1.1.5]
IRONMAN	o [3-2A]
J73C	o [1.1.5]
J73I	-

572 4 implicit conversion of operands

CHOL	-
IRONMAN	n
J73C	-
J73I	n
PASCAL	- 8
CS4	-
J3	-

573 5 as for assignment

CHOL	+ (i.e., none)
IRONMAN	+ 3B (no conversion permitted)
J73C	+ (i.e., none)
J73I	n
PASCAL	+ (i.e., none)
CS4	+ (i.e., none)
J3	+ (i.e., none)

574 4 evaluation order of operands...

CHOL	o [1.1.5]
IRONMAN	. 4C
J73C	o [1.1.5]
J73I	n
J3	2490-4

575 5 strictly left-to-right

CHOL	-
IRONMAN	o [4C]
J73C	-
J73I	n
PASCAL	-
CS4	+ 3.0
J3	+ 2431

576 5 left-to-right within equal precedence

CHOL	-
IRONMAN	o [4C]
J73C	-
J73I	n
PASCAL	-
CS4	-
J3	-

Status Data Type

577 5 order not specified

CHOL +
IRONMAN o [4C]
J73C +
J73I n
PASCAL + 8
CS4 -
J3 -

578 3 constant expression evaluation...

CHOL +
IRONMAN + 4E
J73C +
J73I -
PASCAL -
CS4 + 7.1
J3 -

579 4 successor operation

CHOL +
IRONMAN + 4E (if operation is provided)
J73C +
J73I n
PASCAL -
CS4 - 3.3.4.1
J3 n

580 4 relational operations

CHOL +
IRONMAN + 3-2A, 6C, 4E
J73C +
J73I -
PASCAL -
CS4 + 7.1
J3 -

581 4 conversion from integer values

CHOL +
IRONMAN n
J73C +
J73I n
PASCAL n
CS4 + 7.1
J3 n

Status Data Type

582 3 explicit conversion

CHOL	+
IRONMAN	o [3-2A]
J73C	+
J73I	-
PASCAL	-
CS4	+
J3	-

583 4 from integer

CHOL	+
IRONMAN	? 4B
J73C	+
J73I	-
PASCAL	-
CS4	+ 3.3.4.3
J3	-

584 4 permitted for programmer-defined representations

CHOL	+
IRONMAN	+ 4B, 3-5D
J73C	+
J73I	-
PASCAL	n
CS4	n
J3	n

585 4 programmer-defined conversion operations permitted

CHOL	+
IRONMAN	? 4B
J73C	+
J73I	-
PASCAL	-
CS4	-
J3	-

586 3 exception conditions

CHOL	+
IRONMAN	o [3-2A]
J73C	+
J73I	-
PASCAL	-
CS4	+
J3	-

Status Data Type

587 4 conversion error

CHOL	+
IRONMAN	o [3-2A]
J73C	+
J73I	-
PASCAL	-
CS4	+ 3.3.3.4
J3	-

588 4 successor/predecessor range error

CHOL	+ (optional)
IRONMAN	+ 10B, 13D
J73C	+ (optional)
J73I	-
PASCAL	-
CS4	+ 3.3.4.1
J3	-

Bit Data Type

589 2 Bit Data Type

CHOL	+
IRONMAN	- 3-4A, 1E (sets are required instead)
J73C	+
J73I	+
PASCAL	-
PLI	+
CS4	-
J3	-

590 3 bit strings represented as...

CHOL	o
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	o

591 4 arrays of boolean

CHOL	-
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	-
J73I	-
PLI	-

592 5 all normal array properties and operations apply

CHOL	n *
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	n
J73I	n
PLI	n

593 5 all normal scalar properties and operations apply

CHOL	n *
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	n
J73I	n
PLI	n

594 5 array is packed

CHOL	n *
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	n
J73I	n
PLI	n

595 4 special bit string data type

CHOL	+
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	+
J73I	+ 2.1.3, 2.1.4
PLI	+ 4.1.6, 5.4.6

Bit Data Type

596	3	length attribute...	CHOL	o	
			IRONMAN	n * [3-4A, 1E (sets are required instead)]	
			J73C	o	
597	4	explicit specification prohibited	CHOL	-	
			IRONMAN	n * [3-4A, 1E (sets are required instead)]	
			J73C	-	
			J73I	-	
			PLI	-	
598	4	explicit specification permitted	CHOL	-	
			IRONMAN	n * [3-4A, 1E (sets are required instead)]	
			J73C	+	
			J73I	+ 2.1.3	
			PLI	+ 5.4.6	
599	4	explicit specification required	CHOL	+	
			IRONMAN	n * [3-4A, 1E (sets are required instead)]	
			J73C	-	
			J73I	-	
			PLI	-	
600	4	value fixed at...	CHOL	o	
			IRONMAN	n * [3-4A, 1E (sets are required instead)]	
			J73C	o	
601	5	compile time for...	CHOL	o	
			IRONMAN	n * [3-4A, 1E (sets are required instead)]	
			J73C	o	
602	6	static storage	CHOL	+	
			IRONMAN	n * [3-4A, 1E (sets are required instead)]	
			J73C	+	
			J73I	+ 2.1.3	
			PLI	+ 5.4.6	
603	6	non-static storage	CHOL	-	
			IRONMAN	n * [3-4A, 1E (sets are required instead)]	
			J73C	+	
			J73I	+ 2.1.3	
			PLI	-	

Bit Data Type

604 5	time of string allocation for...
	CHOL o
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C o
605 6	static storage
	CHOL -
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C -
	J73I -
	PLI -
606 6	non-static storage
	CHOL +
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C -
	J73I -
	PLI + 5.4.6
607 4	variability of current length...
	CHOL o
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C o
608 5	variable
	CHOL -
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C -
	J73I -
	PLI + 5.4.55
609 6	fixed maximum length
	CHOL n *
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C n
	J73I n
	PLI + 5.4.6, 5.4.55
610 6	no maximum length
	CHOL n *
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C n
	J73I n
	PLI -

Bit Data Type

611 5	not variable	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+ 2.1.3
	PLI	+ 5.4.34
612 4	max. length independent of word length	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+ 2.1.3
	PLI	+ 5.4.6
613 4	initial allocation length specified in... (heap storage)	
	CHOL	o
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	o
	J73I	n
614 5	declaration	
	CHOL	+ (possibly as runtime expression)
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+ (possibly as run time expression)
	J73I	n
	PLI	+ 12.1, 4.3.2.1, 4.3.2.4, 4.3.2.5
615 5	allocation operation	
	CHOL	-
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	-
	J73I	n
	PLI	- 12.1
616 5	previous generation	
	CHOL	-
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	-
	J73I	n
	PLI	- 12.1
617 3	constants	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+
	PLI	+

Bit Data Type

618 4	literals	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+ 5.3.4
	PLI	+ 2.6.2.1
619 5	base 2	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+ 5.3.4
	PLI	+ 2.6.2.1
620 5	bases 8, 16	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+ 5.3.4
	PLI	-
621 5	other bases	
	CHOL	-
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+ (4, 32)
	J73I	+ 5.3.4 (4, 32)
	PLI	-
622 5	more than one base available	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+ 5.3.4
	PLI	-
623 4	mnemonic names can be specified	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	-
	PLI	-
624 5	run-time values permitted	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	n
	PLI	n

Bit Data Type

625	4	environmental query for max. bit string length
		CHOL +
		IRONMAN n * [3-4A, 1E (sets are required instead)]
		J73C +
		J73I -
		PLI -
626	3	variables
		CHOL +
		IRONMAN n * [3-4A, 1E (sets are required instead)]
		J73C +
		J73I + 4.11, 2.1.3, 2.1.4
		PLI + 4.1.3, 5.4.54, 6, 5.5
627	4	read-only access specifiable (in a subscope)
		CHOL +
		IRONMAN n * [3-4A, 1E (sets are required instead)]
		J73C +
		J73I -
		PLI -
628	4	NULL value specifiable
		CHOL -
		IRONMAN n * [3-4A, 1E (sets are required instead)]
		J73C -
		J73I -
		PLI -
629	4	undefined value exists
		CHOL -
		IRONMAN n * [3-4A, 1E (sets are required instead)]
		J73C -
		J73I -
		PLI -
630	5	is specifiable
		CHOL n
		IRONMAN n * [3-4A, 1E (sets are required instead)]
		J73C n
		J73I n
		PLI n
631	3	parameters
		CHOL +
		IRONMAN n * [3-4A, 1E (sets are required instead)]
		J73C +
		J73I + 2.2
		PLI + 6.10

Bit Data Type

- 632 4 **exact** match required (same max length)
- CHOL +
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C -
 J73I - 2.2.3.1, 1.7
 PLI - 6.10.1, 6.10.2
- 633 4 **safe** length match required
- CHOL -
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C -
 J73I - 2.2.3.1, 1.7
 PLI - 6.10.1, 6.10.2
- 634 4 **actual** argument length used as formal length
- CHOL +
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C -
 J73I -
 PLI + 6.10.3
- 635 4 **length** match as in assignment
- CHOL + (i.e., exact match)
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C +
 J73I + 2.2.3.1
 PLI + 6.10.1, 6.10.2, 12.2
- 636 4 **can** specify relationships for parameter lengths
- CHOL -
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C -
 J73I -
 PLI -
- 637 4 **match** with actual parameters of other type
- CHOL -
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C + (boolean, unless RESTRICTED)
 J73I - 2.2.3.1, 1.7
 PLI + 6.10.1, 6.10.2
- 638 5 **as** in assignment
- CHOL + (i.e., none)
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C +
 J73I + 2.2.3.1 (i.e., none)
 PLI + 6.10.1, 6.10.2, 12.2

Bit Data Type

639	3	bit string function values	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 2.2.2
		PLI	+ 12.21, 5.4.47, 6.7
640	3	bit string and, or, not	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 4.5
		PLI	+ 7.3.2
641	4	parentheses required	
		CHOL	-
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	-
		J73I	- 4.5.1
		PLI	- 7.2
642	3	exclusive or	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 4.5
		PLI	+ 13.1.4
643	3	other Boolean functions	
		CHOL	o
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+ (equivalence)
		J73I	+ 4.5 (equivalence)
		PLI	+ 13.1.4 (all others)
644	3	concatenate	
		CHOL	-
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	-
		J73I	-
		PLI	+ 7.3.3
645	4	fixed length	
		CHOL	n
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	n
		J73I	n
		PLI	+ 7.3.3

Bit Data Type

646 4	variable length	
	CHOL	n
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	n
	J73I	n
	PLI	+ 7.3.3
647 3	substring operation	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+
	PLI	+
648 4	fixed length	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+ 4.10.4
	PLI	+ 13.1.16
649 4	variable length	
	CHOL	-
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+ 4.10.4
	PLI	+ 13.1.16
650 4	length defaultable to...	
	CHOL	-
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+
	PLI	+
651 5	one	
	CHOL	n
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+ 4.10.4
	PLI	-
652 5	end of string	
	CHOL	n
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	-
	J73I	-
	PLI	+ 13.1.16

Bit Data Type

- 653 5 default usage consistent with subroutine parameter conventions
- | | |
|---------|--|
| CHOL | n |
| IRONMAN | n * [3-4A, 1E (sets are required instead)] |
| J73C | - |
| J73I | - |
| PLI | - |
- 654 5 default usage consistent with array indexing conventions
- | | |
|---------|--|
| CHOL | n |
| IRONMAN | n * [3-4A, 1E (sets are required instead)] |
| J73C | - |
| J73I | - |
| PLI | - |
- 655 4 special syntax to identify substring
- | | |
|---------|--|
| CHOL | o |
| IRONMAN | n * [3-4A, 1E (sets are required instead)] |
| J73C | - |
| J73I | - |
| PLI | - |
- 656 4 subscript range check
- | | |
|---------|--|
| CHOL | + |
| IRONMAN | n * [3-4A, 1E (sets are required instead)] |
| J73C | + (if RESTRICTED) |
| J73I | - 4.10.4 |
| PLI | + 13.1.16, 10.4.14 |
- 657 5 similar to array subscript range check
- | | |
|---------|--|
| CHOL | + |
| IRONMAN | n * [3-4A, 1E (sets are required instead)] |
| J73C | + |
| J73I | + (i.e., none) |
| PLI | + 10.4.14, 10.4.16 |
- 658 4 substrings permitted wherever strings permitted
- | | |
|---------|--|
| CHOL | + |
| IRONMAN | n * [3-4A, 1E (sets are required instead)] |
| J73C | + |
| J73I | + 4.10.4, 4.11 |
| PLI | + 13.1.16, 12.2 |
- 659 5 as sources
- | | |
|---------|--|
| CHOL | + |
| IRONMAN | n * [3-4A, 1E (sets are required instead)] |
| J73C | + |
| J73I | + 4.10.4 |
| PLI | + 13.1.16 |

Bit Data Type

660	5	as targets	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 4.11
		PLI	+ 12.2
661	3	shift	
		CHOL	+ (by extension)
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 4.10.9
		PLI	-
662	4	left, right	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 4.10.9
		PLI	-
663	4	circular (rotate)	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	- (by extension)
		J73I	-
		PLI	-
664	3	length function	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 4.10.10
		PLI	+ 13.1.11
665	3	string replication functions...	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	-
		J73I	-
		PLI	+
666	4	constant repetition factor	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	n *
		J73I	-
		PLI	+ 2.6.2.1 (literals)

Bit Data Type

667 4 variable repetition factor

CHOL	-
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	n *
J73I	-
PLI	+ 13.1.7 (COPY function)

668 4 recursively embedded repetition

CHOL	-
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	n *
J73I	-
PLI	+ 13.1.7

669 4 applied to literal strings only

CHOL	+
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	n *
J73I	-
PLI	-

670 3 REVERSE

CHOL	-
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	-
J73I	-
PLI	+ 13.1.13

671 3 access to representations, UNSPEC...

CHOL	+
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	+
J73I	+
PLI	+

672 4 function

CHOL	+
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	+
J73I	+ 4.10.4
PLI	+ 13.6.19

673 4 pseudo-variable

CHOL	-
IRONMAN	n * [3-4A, 1E (sets are required instead)]
J73C	+
J73I	+ 4.11
PLI	+ 12.2

Bit Data Type

- 674 3 relational operations
- CHOL +
 - IRONMAN n * [3-4A, 1E (sets are required instead)]
 - J73C +
 - J73I + 4.6, 5.2.2
 - PLI + 7.3.4
- 675 4 equality/inequality
- CHOL +
 - IRONMAN n * [3-4A, 1E (sets are required instead)]
 - J73C +
 - J73I + 4.6, 5.2.2
 - PLI + 7.3.4
- 676 4 less than, greater than, etc.
- CHOL - (convert to integer for these)
 - IRONMAN n * [3-4A, 1E (sets are required instead)]
 - J73C +
 - J73I + 4.6, 5.2.2
 - PLI + 7.3.4
- 677 4 implicit lengthening in relational operation
- CHOL -
 - IRONMAN n * [3-4A, 1E (sets are required instead)]
 - J73C +
 - J73I + 4.6.2
 - PLI + 7.3.4.2
- 678 4 implicit truncating in relational operation
- CHOL -
 - IRONMAN n * [3-4A, 1E (sets are required instead)]
 - J73C -
 - J73I -
 - PLI -
- 679 3 assignment of bit strings
- CHOL +
 - IRONMAN n * [3-4A, 1E (sets are required instead)]
 - J73C +
 - J73I + 3.3
 - PLI + 12.2
- 680 4 implicit length conversion...
- CHOL o
 - IRONMAN n * [3-4A, 1E (sets are required instead)]
 - J73C o

Bit Data Type

681	5	prohibited	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	-
		J73I	-
		PLI	-
682	5	truncated on right	
		CHOL	-
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	-
		J73I	-
		PLI	+ 12.2
683	5	truncated on left	
		CHOL	-
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 3.3, 1.7.2
		PLI	-
684	5	length exception when source longer	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+ (if RESTRICTED)
		J73I	-
		PLI	-
685	5	length exception only if non-zeroes	
		CHOL	-
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	-
		J73I	-
		PLI	-
686	5	padding on right	
		CHOL	-
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	-
		J73I	-
		PLI	+ 12.2
687	5	padding on left	
		CHOL	-
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 3.3, 1.7.2
		PLI	-

Bit Data Type

688 4	implicit conversion in assignment	
	CHOL	-
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+ (unless RESTRICTED)
	J73I	+ 1.7
	PLI	+
689 5	from integer	
	CHOL	n *
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	-
	J73I	-
	PLI	+ 8.2.8, 12.2
690 5	from real	
	CHOL	n *
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	-
	J73I	-
	PLI	+ 8.2.8, 12.2
691 5	from character to representation	
	CHOL	n *
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	-
	J73I	-
	PLI	-
692 5	from character as bit literal	
	CHOL	n *
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	-
	J73I	-
	PLI	+ 8.2.4, 12.2
693 5	from other to representation	
	CHOL	n *
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+ (table entry and boolean, unless RESTRICTED)
	J73I	+ 4.11 (table entry)
	PLI	-
694 3	expression evaluation...	
	CHOL	o
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	o

Bit Data Type

695 4	implicit length conversion for some operations...
	CHOL o
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C o
696 5	prohibited
	CHOL +
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C -
	J73I -
	PLI -
697 5	truncate on right
	CHOL -
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C -
	J73I -
	PLI -
698 5	truncate on left
	CHOL -
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C -
	J73I -
	PLI -
699 5	pad on right with zeroes
	CHOL -
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C -
	J73I -
	PLI + 7.3.2.2
700 5	pad on left with zeroes
	CHOL -
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C +
	J73I + 1.7.2
	PLI -
701 4	implicit conversion of operands
	CHOL -
	IRONMAN n * [3-4A, 1E (sets are required instead)]
	J73C + (unless RESTRICTED)
	J73I + 1.7, 4.11
	PLI + 7.3.2.1

Bit Data Type

- 702 5 as in assignment
CHOL + (i.e., none)
IRONMAN n * [3-4A, 1E (sets are required instead)]
J73C +
J73I + 3.3
PLI + 7.3.2.1, 12.2
- 703 4 evaluation order of operands...
CHOL o
IRONMAN n * [3-4A, 1E (sets are required instead)]
J73C o
- 704 5 strictly left-to-right
CHOL -
IRONMAN n * [3-4A, 1E (sets are required instead)]
J73C -
J73I -
PLI -
- 705 5 left-to-right within equal precedence
CHOL -
IRONMAN n * [3-4A, 1E (sets are required instead)]
J73C -
J73I -
PLI -
- 706 5 order not specified
CHOL +
IRONMAN n * [3-4A, 1E (sets are required instead)]
J73C +
J73I + 4.8.3
PLI + 7.1.4
- 707 3 constant expression evaluation
CHOL +
IRONMAN n * [3-4A, 1E (sets are required instead)]
J73C +
J73I + 4.9
PLI -
- 708 4 and, or, not, exclusive-or operators
CHOL +
IRONMAN n * [3-4A, 1E (sets are required instead)]
J73C +
J73I + 4.9, 4.5
PLI -

Bit Data Type

709 4	other Boolean functions	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+ 4.9, 4.5 (equivalence)
	PLI	-
710 4	concatenate	
	CHOL	n
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	n
	J73I	n
	PLI	-
711 4	substring	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	-
	PLI	-
712 4	shift	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	+ 4.9
	PLI	n
713 4	length	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	+
	J73I	-
	PLI	-
714 4	string replication	
	CHOL	+
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	n
	J73I	n
	PLI	-
715 4	REVERSE	
	CHOL	n
	IRONMAN	n * [3-4A, 1E (sets are required instead)]
	J73C	n
	J73I	n
	PLI	-

Bit Data Type

716	4	UNSPEC	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	-
		PLI	-
717	4	relational operators	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 4.9, 5.2.2
		PLI	-
718	4	implicit conversion	
		CHOL	n
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	-
		PLI	-
719	4	explicit conversion	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 4.9
		PLI	-
720	3	explicit conversion...	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+
		PLI	+
721	4	from integer	
		CHOL	+
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	+
		J73I	+ 1.7.1.2.1
		PLI	+ 13.1.3
722	4	from fixed point	
		CHOL	n
		IRONMAN	n * [3-4A, 1E (sets are required instead)]
		J73C	n
		J73I	n
		PLI	+ 13.1.3

Bit Data Type

723 4 from floating point
 CHOL +
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C +
 J73I + 1.7.1.2.1
 PLI + 13.1.3

724 4 from status
 CHOL +
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C +
 J73I + 1.7.1.2.1, 2.4 (status type is really integer)
 PLI n

725 4 from boolean
 CHOL +
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C +
 J73I n
 PLI n

726 4 from character
 CHOL +
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C + (UNSPEC)
 J73I + 1.7.1.2.1 (UNSPEC)
 PLI + 13.1.3

727 4 from other scalar types
 CHOL +
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C +
 J73I -
 PLI + 13.6.4, 13.6.15 (pointer)

728 4 from set
 CHOL n
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C n
 J73I n
 PLI n

729 3 exception conditions
 CHOL +
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C +
 J73I +
 PLI +

Bit Data Type

730 4 conversion error
 CHOL +
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C +
 J73I + 1.7.1 (go to an error label)
 PLI + 10.4.2

731 4 subscript range (substring)
 CHOL +
 IRONMAN n * [3-4A, 1E (sets are required instead)]
 J73C + (if RESTRICTED)
 J73I - 4.10.4
 PLI + 10.4.14

Boolean Data Type

732 2 Boolean Data Type

CHOL	+ 1.1.3
IRONMAN	+ 3-2C
J73C	+ 1.1.3
J73I	-
PASCAL	+ 6.1.2
PLI	-
CS4	+ 3.1
J3	+

733 3 is declared/represented as a length one bit string

CHOL	-
IRONMAN	- 3-2C
J73C	-
J73I	+ 2.1.3, 4.6, 4.7, 3.7
PASCAL	- 6.1.2
PLI	+ 5.4.6, 7.3.4.3, 12.16
CS4	- 3.1
J3	- 2422.4, 2463.14

734 3 constants

CHOL	+ 1.1.3
IRONMAN	o [3-2C]
J73C	+ 1.1.3
J73I	-
PASCAL	+
PLI	-
CS4	+
J3	+

735 4 literals: TRUE and FALSE

CHOL	+
IRONMAN	+ 3-2C, 3-2A
J73C	+
J73I	- 5.3
PASCAL	+ 6.1.2
PLI	- 2.6.2.1
CS4	+ 3.1.1
J3	+ 2418.10

736 4 mnemonic names can be specified

CHOL	+
IRONMAN	+ 5A
J73C	+
J73I	-
PASCAL	? 5, 6.1.2
PLI	-
CS4	+ 2.3
J3	-

Boolean Data Type

737 5 run-time values permitted

CHOL	+
IRONMAN	+ 5A
J73C	+
J73I	n
PASCAL	- 5
PLI	n
CS4	+ 2.3
J3	n

738 3 variables

CHOL	+
IRONMAN	+ 5B
J73C	+
J73I	- 4.11, 2.1.3, 2.1.4
PASCAL	+ 7
PLI	- 4.1.3, 5.4.54, 6, 5.5
CS4	+ 2.3
J3	+ 2422, 2463.14, 2464

739 4 read-only access specifiable (in a subscope)

CHOL	+
IRONMAN	o 3-5B
J73C	+
J73I	n
PASCAL	-
PLI	n
CS4	-
J3	-

740 4 NULL value specifiable

CHOL	-
IRONMAN	o [5B]
J73C	-
J73I	n
PASCAL	-
PLI	n
CS4	-
J3	-

741 4 undefined value exists

CHOL	-
IRONMAN	o [5B]
J73C	-
J73I	n
PASCAL	-
PLI	n
CS4	+ 2.3.2, 3.1.3.4
J3	-

Boolean Data Type

- 742 5 is specifiable
- | | |
|---------|--------|
| CHOL | n |
| IRONMAN | o [5B] |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | n |
| CS4 | - |
| J3 | n |
- 743 3 parameter usage permitted
- | | |
|---------|----------------------|
| CHOL | + |
| IRONMAN | + 7G |
| J73C | + |
| J73I | - 2.2 |
| PASCAL | + 10, 9.1.2, 11, 8.2 |
| PLI | - 6.10 |
| CS4 | + 5.1.1 |
| J3 | + 2446, 2484 |
- 744 3 function value
- | | |
|---------|----------------------|
| CHOL | + |
| IRONMAN | + 7D |
| J73C | + |
| J73I | - 2.2.2 |
| PASCAL | + 11 |
| PLI | - 12.21, 5.4.47, 6.7 |
| CS4 | + 5.1 |
| J3 | + 2432, 2485 |
- 745 3 boolean operations: and, or, not
- | | |
|---------|-----------------------|
| CHOL | + 1.1.3 |
| IRONMAN | + 3-2C |
| J73C | + 1.1.3 |
| J73I | - 4.5 |
| PASCAL | + 8.1.1, 8.1.2, 8.1.3 |
| PLI | - 7.3.2 |
| CS4 | + 3.1.4.1 |
| J3 | + 2439 |
- 746 4 parentheses required
- | | |
|---------|----------|
| CHOL | - |
| IRONMAN | o [3-2C] |
| J73C | - |
| J73I | n |
| PASCAL | - 8 |
| PLI | n |
| CS4 | - 3.1.5 |
| J3 | - 2439.1 |

Boolean Data Type

747 3 exclusive or

CHOL	+
IRONMAN	- 3-2C
J73C	+
J73I	- 4.5
PASCAL	+ 8.1.4 (not-equals relation)
PLI	- 13.1.4
CS4	+ 3.1.4.1
J3	-

748 4 parentheses required

CHOL	-
IRONMAN	n
J73C	-
J73I	n
PASCAL	- 8
PLI	n
CS4	- 3.1.5
J3	n

749 3 other boolean operators

CHOL	-
IRONMAN	- 3-2C
J73C	-
J73I	- 4.5
PASCAL	+ 8.1.4 (equals and less-than-or-equals relations)
PLI	- 13.1.4
CS4	+ 3.1.4.1 (NAND, NOR, EQV, IMP)
J3	-

750 3 relational operations

CHOL	+
IRONMAN	o [3-2C]
J73C	+
J73I	- 4.6
PASCAL	+ 8.1.4
PLI	- 7.3.4
CS4	+ 3.1.4.1
J3	- 2437.3, 2439.1

751 4 equality/inequality

CHOL	+
IRONMAN	+ 3-2C, 3-2A, 3-2B
J73C	+
J73I	-
PASCAL	+ 8.1.4
PLI	- 7.3.4
CS4	+ 3.1.4.1
J3	-

Boolean Data Type

- 752 4 less than, greater than, etc.
- | | |
|---------|--------------------|
| CHOL | - |
| IRONMAN | - 3-2C, 3-2A, 3-2B |
| J73C | - |
| J73I | - |
| PASCAL | + 8.1.4 |
| PLI | - 7.3.4 |
| CS4 | - |
| J3 | - |
- 753 3 assignment
- | | |
|---------|----------------|
| CHOL | + |
| IRONMAN | + 5F |
| J73C | + |
| J73I | - 3.3 |
| PASCAL | + 9.1.1 |
| PLI | - 12.2 |
| CS4 | + 4.2, 3.1.3.2 |
| J3 | + 2442 |
- 754 4 implicit conversion in assignment
- | | |
|---------|---------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | - |
| J73I | n |
| PASCAL | - 9.1.1 |
| PLI | n |
| CS4 | - 4.2 |
| J3 | - |
- 755 3 expression evaluation...
- | | |
|---------|-----------|
| CHOL | o [1.1.3] |
| IRONMAN | o [3-2C] |
| J73C | o [1.1.3] |
- 756 4 implicit conversion in evaluating operands
- | | |
|---------|-----------------------|
| CHOL | - |
| IRONMAN | - 3B |
| J73C | + (unless RESTRICTED) |
| J73I | + 4.7 |
| PASCAL | - 8 |
| PLI | + 12.16, 12.9 |
| CS4 | - |
| J3 | - 2439 |

Boolean Data Type

757 5 bit to Boolean
CHOL n *
IRONMAN n
J73C + (unless RESTRICTED)
J73I + 4.7
PASCAL n
PLI + 12.16, 12.9
CS4 n
J3 n

758 5 integer to Boolean
CHOL n *
IRONMAN n * 3B
J73C -
J73I -
PASCAL -
PLI -
CS4 -
J3 -

759 5 other to Boolean
CHOL n *
IRONMAN n * 3B
J73C -
J73I -
PASCAL -
PLI -
CS4 -
J3 -

760 4 evaluation order of operands...
CHOL o [1.1.3]
IRONMAN o [3-2C]
J73C o [1.1.3]
J73I n
PLI n
J3 2490-4

761 5 exhaustive
CHOL -
IRONMAN - 6D
J73C -
J73I n
PASCAL -
PLI n
CS4 -
J3 -

Boolean Data Type

762 6	strictly left-to-right
CHOL	n *
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	n
J3	n
763 6	left-to-right within equal precedence
CHOL	n *
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	n
J3	n
764 6	order not specified
CHOL	n *
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	+
J3	n
765 5	short-circuited
CHOL	+ 1.1.3
IRONMAN	+ 6D, 10E, 4C
J73C	+ 1.1.3
J73I	n
PASCAL	-
PLI	n
CS4	+ 3.1.4.1
J3	+ 2439.4, 2439.6-.7
766 5	not specified
CHOL	-
IRONMAN	- 6D
J73C	-
J73I	n
PASCAL	+ 8, 4.A
PLI	n
CS4	-
J3	-

Boolean Data Type

767 3 constant expression evaluation

CHOL	+
IRONMAN	+ 4E, 6C
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	+ 7.1
J3	-

768 4 applied to and, or, not, exclusive-or

CHOL	+
IRONMAN	+ 4E, 6C
J73C	+
J73I	n
PASCAL	-
PLI	n
CS4	+ 7.1
J3	-

769 4 applied to equality/inequality

CHOL	+
IRONMAN	+ 4E, 6C
J73C	+
J73I	n
PASCAL	-
PLI	n
CS4	+ 7.1
J3	n

770 3 explicit conversions

CHOL	+
IRONMAN	o [3-2C]
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	+ 3.1.4.2
J3	+

771 4 from integer

CHOL	+
IRONMAN	o 4B
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	+ 2429

Boolean Data Type

772 4 from bit

CHOL	+
IRONMAN	n
J73C	+
J73I	-
PASCAL	n
PLI	-
CS4	n
J3	n

773 4 from other

CHOL	o
IRONMAN	? 4B
J73C	o
J73I	-
PASCAL	-
PLI	-
CS4	+ 3.1.4.2 (char string)
J3	+ 2429 (fixed point real)

774 3 exception condition

CHOL	+
IRONMAN	o [3-2C]
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	+
J3	-

775 4 conversion error

CHOL	+
IRONMAN	? 4B
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	+ 3.1.3.4
J3	-

Character String Data Type

776 2 Character String Data Type

CHOL	+ 1.1.4, 1.2.2
IRONMAN	+ 3-2D, 3-3D, 3-3E
J73C	+ 1.1.4, 1.2.2
J73I	+
PASCAL	+ 6.1.2, 4
PLI	+
CS4	+ 3.6
J3	+

777 3 strings represented as...

CHOL	o [1.1.4, 1.2.2]
IRONMAN	o [3-2D, 3-3D, 3-3E]
J73C	o [1.1.4, 1.2.2]

778 4 arrays of single characters

CHOL	-
IRONMAN	+ 2H, 3-2D, 3-3D, 3-3E
J73C	-
J73I	-
PASCAL	+ 4
PLI	-
CS4	-
J3	-

779 5 all normal array properties and operations apply

CHOL	n *
IRONMAN	+ 2H, 3-2D, 3-3D, 3-3E
J73C	n
J73I	n
PASCAL	+
PLI	n
CS4	n
J3	n

780 5 all normal scalar properties and operations apply

CHOL	n *
IRONMAN	+ 3-2D
J73C	n
J73I	n
PASCAL	+
PLI	n
CS4	n
J3	n

Character String Data Type

- 781 6 subranges of single characters
- | | |
|---------|----------------|
| CHOL | n * |
| IRONMAN | o 3-2D, 3-2B |
| J73C | n |
| J73I | n |
| PASCAL | + 6.1.3, 6.1.2 |
| PLI | n |
| CS4 | n |
| J3 | n |
- 782 5 array is packed
- | | |
|---------|------------|
| CHOL | n * |
| IRONMAN | o 11A, 12C |
| J73C | n |
| J73I | n |
| PASCAL | + 4 |
| PLI | n |
| CS4 | n |
| J3 | n |
- 783 4 special string data type
- | | |
|---------|-------------------------|
| CHOL | + |
| IRONMAN | - 2H, 3-2D |
| J73C | + |
| J73I | + 2.1.3, 2.1.4 |
| PASCAL | - |
| PLI | + 4.1.6, 5.4.8 |
| CS4 | + 3.6.1 |
| J3 | + 2419.6, 2422, 2463.12 |
- 784 3 length attribute...
- | | |
|---------|----------------------|
| CHOL | o [1.1.4, 1.2.2] |
| IRONMAN | o [3-2D, 3-3D, 3-3E] |
| J73C | o [1.1.4, 1.2.2] |
- 785 4 explicit specification prohibited
- | | |
|---------|--------|
| CHOL | - |
| IRONMAN | - 3-3D |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |

Character String Data Type

786 4 explicit specification permitted

CHOL -
IRONMAN - 3-3D
J73C +
J73I + 2.1.3
PASCAL -
PLI + 5.4.8
CS4 -
J3 -

787 4 explicit specification required

CHOL +
IRONMAN + 3-3D
J73C -
J73I - 2.1.3
PASCAL + 6.2.1
PLI -
CS4 + 3.6.1
J3 + 2463.12

788 4 value fixed at...

CHOL o [1.1.4, 1.2.2]
IRONMAN o [3-2D, 3-3D, 3-3E]
J73C o [1.1.4, 1.2.2]

789 5 compile time for...

CHOL o [1.1.4, 1.2.2]
IRONMAN o [3-2D, 3-3D, 3-3E]
J73C o [1.1.4, 1.2.2]

790 6 static storage

CHOL +
IRONMAN ? 3-3D
J73C +
J73I + 2.1.3
PASCAL + 6.2.1
PLI + 5.4.8
CS4 ? 3.6.1, 2.3.3, 7.1
J3 + 2463.12, 2462.3

791 6 non-static storage

CHOL -
IRONMAN - 3-3D
J73C -
J73I + 2.1.3
PASCAL + 6.2.1
PLI -
CS4 -
J3 n

Character String Data Type

792	5	time of string allocation for...	
		CHOL	o [1.1.4, 1.2.2]
		IRONMAN	o [3-2D, 3-3D, 3-3E]
		J73C	o [1.1.4, 1.2.2]
793	6	static storage	
		CHOL	-
		IRONMAN	+ 3-3D
		J73C	-
		J73I	-
		PASCAL	-
		PLI	-
		CS4	? 3.6.1, 2.3.3, 7.1
		J3	-
794	6	non-static storage	
		CHOL	+
		IRONMAN	+ 3-3D
		J73C	+
		J73I	-
		PASCAL	-
		PLI	+ 5.4.8
		CS4	+ 3.6.1
		J3	n
795	4	variability of current length...	
		CHOL	o [1.1.4, 1.2.2]
		IRONMAN	o [3-2D, 3-3D, 3-3E]
		J73C	o [1.1.4, 1.2.2]
796	5	variable	
		CHOL	-
		IRONMAN	- 3-2D, 3-3D
		J73C	-
		J73I	-
		PASCAL	-
		PLI	+ 5.4.55
		CS4	+ 3.6.1
		J3	-
797	6	fixed maximum length	
		CHOL	n *
		IRONMAN	n
		J73C	n
		J73I	n
		PASCAL	n
		PLI	+ 5.4.8, 5.4.55
		CS4	+ 3.6.1
		J3	n

Character String Data Type

798 6 no maximum length
 CHOL n *
 IRONMAN n
 J73C n
 J73I n
 PASCAL n
 PLI -
 CS4 -
 J3 n

799 5 not variable
 CHOL + 1.2.2
 IRONMAN + 3-2D, 3-3D
 J73C + 1.2.2
 J73I + 2.1.3
 PASCAL + 6.2.1
 PLI + 5.4.34
 CS4 + 3.6.1
 J3 + 2463.12

800 4 max. length independent of word length
 CHOL +
 IRONMAN + 13F
 J73C +
 J73I + 2.1.3
 PASCAL + 4, 6.2.1
 PLI + 5.4.8
 CS4 + 3.6.1
 J3 + 2419.6, 2408.7

801 4 initial allocation length specified in... (heap storage)
 CHOL o [1.1.4, 1.2.2]
 IRONMAN o [3-2D, 3-3D, 3-3E]
 J73C o [1.1.4, 1.2.2]
 J73I n
 CS4 n
 J3 n

802 5 declaration
 CHOL + (possibly as run time expression)
 IRONMAN ? 3-3I, 3-3D
 J73C + (possibly as run time expression)
 J73I n
 PASCAL + 10.1.2, 6.2.1
 PLI + 12.1, 4.3.2.1, 4.3.2.4, 4.3.2.5
 CS4 n
 J3 n

Character String Data Type

803 5	allocation operation	
	CHOL	-
	IRONMAN	? 3-3I, 12D, 3-3D
	J73C	-
	J73I	n
	PASCAL	- 10.1.2
	PLI	- 12.1
	CS4	n
	J3	n
804 5	previous generation	
	CHOL	-
	IRONMAN	- 3-3I, 1A
	J73C	-
	J73I	n
	PASCAL	- 10.1.2
	PLI	- 12.1
	CS4	n
	J3	n
805 3	constants	
	CHOL	+
	IRONMAN	o [3-2D, 3-3D, 3-3E]
	J73C	+
	J73I	+
	PASCAL	+
	PLI	+
	CS4	+
	J3	+
806 4	literals	
	CHOL	+
	IRONMAN	o [3-2D, 3-3D, 3-3E]
	J73C	+
	J73I	+ 5.3.5
	PASCAL	+ 4
	PLI	+ 2.6.2.2
	CS4	+ 1.3.2.4
	J3	+ 2418.8-.9, 2418.5
807 5	language specified code(s)	
	CHOL	+
	IRONMAN	+ 2A
	J73C	+
	J73I	-
	PASCAL	-
	PLI	+ 2.6.2.2 (ASCII)
	CS4	+ 1.3.1 (ASCII)
	J3	+ 2416.1, 2418.8, 2419.6

Character String Data Type

808 5 implementation-dependent code(s)

CHOL -
IRONMAN - 3-2D, 13F, 1G
J73C +
J73I + 5.3.5.2
PASCAL + 4, 6.1.2, 2
PLI -
CS4 -
J3 + 2418.9, 2419.6, 2416.2

809 5 programmer-definable code(s)

CHOL +
IRONMAN + 3-2D
J73C +
J73I -
PASCAL -
PLI -
CS4 -
J3 -

810 5 more than one code

CHOL +
IRONMAN - 2A
J73C +
J73I -
PASCAL -
PLI -
CS4 -
J3 + 2463.12, 2418.8-.9, 2419.6, 2416.1-.2

811 5 upper and lower case...

CHOL o
IRONMAN o [3-2D, 3-3D, 3-3E]
J73C o

812 6 both are standardly available

CHOL -
IRONMAN - 2A
J73C -
J73I -
PASCAL ? 3, 4, 6.1.2
PLI + 2.6.1, 2.6.2.2
CS4 + 1.3.1
J3 -

Character String Data Type

813 6 one is standard, the other is implementation dependent

CHOL	+
IRONMAN	- 2A
J73C	+
J73I	+ 5.3.5.2
PASCAL	? 3, 4, 6.1.2
PLI	-
CS4	-
J3	+ 2416.2, 2418.5

814 6 only one is available

CHOL	-
IRONMAN	+ 2A
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

815 5 unprintable characters

CHOL	+ 1.1.4.1, 1.2.2
IRONMAN	+ 3-2D
J73C	+ 1.1.4.1, 1.2.2
J73I	+ 5.3.5.2
PASCAL	? 6.1.2
PLI	+ 2.6.2.2
CS4	-
J3	+ 2416.2, 2418.5

816 5 termination symbol...

CHOL	o
IRONMAN	o [3-2D, 3-3D, 3-3E]
J73C	o

817 6 same as initiating character

CHOL	o
IRONMAN	o 2H
J73C	+
J73I	+ 5.3.5.1
PASCAL	+ 4
PLI	+ 2.6.2.2
CS4	+ 1.3.2.4
J3	-

Character String Data Type

818 6	includable in string by doubling CHOL o IRONMAN o 2H J73C + J73I + 5.3.5.2 PASCAL + 4 PLI + 2.6.2.2 CS4 + 1.3.2.4 J3 -
819 6	includable in string by an escape character CHOL o IRONMAN o 2H J73C - J73I - PASCAL - PLI - CS4 - J3 -
820 6	includable in string because length specified CHOL o IRONMAN - 2H J73C - J73I - PASCAL - PLI - CS4 - J3 + 2418.8-.9
821 6	statement delimiter directly includable CHOL o IRONMAN o 2H J73C + J73I + 5.3.5.2 PASCAL + 4 PLI + 2.6.2.2 CS4 + 1.3.2.4 J3 + 2418.8-.9
822 6	before end of line CHOL o IRONMAN + 2H J73C ? J73I ? 5.2, 5.5, 5.3.5 PASCAL - 4 PLI - 2.6.2.2, 2.6.4 CS4 - J3 ? 2418.8-.9

Character String Data Type

823 6 end of line ignored if literal crosses line
 CHOL +
 IRONMAN n 2H
 J73C ?
 J73I ? 5.2, 5.5, 5.3.5
 PASCAL + 4, 12.4, 6.2.4
 PLI ~ 2.6.2.2, 2.6.4
 CS4 + 1.3.2.4
 J3 ? 2418.8-.9

824 5 single character literals
 CHOL -
 IRONMAN o 2H
 J73C -
 J73I -
 PASCAL + 4
 PLI -
 CS4 -
 J3 -

825 5 length one string literals
 CHOL +
 IRONMAN o 2H
 J73C +
 J73I + 5.3.5
 PASCAL - 4
 PLI + 2.6.2.2
 CS4 + 1.3.2.4
 J3 + 2418.8-.9

826 6 by conversion of single character literals
 CHOL -
 IRONMAN o [2H]
 J73C -
 J73I -
 PASCAL n
 PLI -
 CS4 -
 J3 -

827 5 requirement for EBCDIC as preferred character set
 CHOL -
 IRONMAN - 3-2D, 2A
 J73C -
 J73I -
 PASCAL -
 PLI -
 CS4 -
 J3 -

Character String Data Type

828 5 requirement for ASCII as preferred character set

CHOL	+
IRONMAN	+ 3-2D, 2A, 1G
J73C	+
J73I	+ 5.3.5.2
PASCAL	-
PLI	+ 2.6.2.2
CS4	+ 1.3.1
J3	-

829 4 mnemonic names can be specified

CHOL	+
IRONMAN	+ 5A
J73C	+
J73I	-
PASCAL	+ 5
PLI	-
CS4	+ 2.3
J3	-

830 5 figurative constants

CHOL	-
IRONMAN	- 1E
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

831 5 run-time values permitted

CHOL	+
IRONMAN	+ 5A
J73C	+
J73I	n
PASCAL	- 5
PLI	n
CS4	+ 2.3
J3	n

832 4 environmental enquiries

CHOL	+
IRONMAN	+ 11C
J73C	+
J73I	+
PASCAL	-
PLI	-
CS4	-
J3	-

Character String Data Type

833	5	maximum length permitted	
		CHOL	+
		IRONMAN	o [11C]
		J73C	+
		J73I	-
		PASCAL	-
		PLI	-
		CS4	-
		J3	-
834	5	default character set	
		CHOL	n
		IRONMAN	o [11C]
		J73C	+
		J73I	-
		PASCAL	-
		PLI	-
		CS4	-
		J3	-
835	5	number of bits per character	
		CHOL	+
		IRONMAN	o [11C]
		J73C	+
		J73I	+ 1.2.2
		PASCAL	-
		PLI	-
		CS4	-
		J3	-
836	3	variables	
		CHOL	+
		IRONMAN	+ 5B
		J73C	+
		J73I	+ 4.11, 2.1.3, 2.1.4
		PASCAL	+ 7
		PLI	+ 4.1.3, 5.4.54, 6, 5.5
		CS4	+ 2.3
		J3	+ 2422, 2463.12, 2464
837	4	read-only access specifiable (in a subscope)	
		CHOL	+
		IRONMAN	o 3-5B
		J73C	+
		J73I	-
		PASCAL	-
		PLI	-
		CS4	-
		J3	-

Character String Data Type

838 4 NULL value specifiable

CHOL	-
IRONMAN	o [5B]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

839 4 undefined value exists

CHOL	-
IRONMAN	o [5B]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	+ 2.3.2, 3.6.3.4
J3	-

840 5 is specifiable

CHOL	n
IRONMAN	o [5B]
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	-
J3	n

841 3 parameter usage permitted

CHOL	+
IRONMAN	+ 7G
J73C	+
J73I	+ 2.2
PASCAL	+ 10, 9.1.2, 11, 8.2
PLI	+ 6.10
CS4	+ 5.1.1
J3	+ 2446, 2484

842 4 exact match required (same max length)

CHOL	+
IRONMAN	+ 7H, 7G (if formal has fixed length)
J73C	-
J73I	- 2.2.3.1, 1.7
PASCAL	?
PLI	- 6.10.1, 6.10.2
CS4	+ 5.1.1.1
J3	-

Character String Data Type

- 843 4 safe length match required
- CHOL -
 - IRONMAN - 7H
 - J73C -
 - J73I - 2.2.3.1, 1.7
 - PASCAL ?
 - PLI - 6.10.1, 6.10.2
 - CS4 + 3.6.1
 - J3 -
- 844 4 actual argument length used as formal length
- CHOL +
 - IRONMAN + 7H, 7G
 - J73C +
 - J73I -
 - PASCAL - 6.2.1, 10
 - PLI + 6.10.3
 - CS4 + 3.6.1, 3.4.1
 - J3 -
- 845 4 length match as in assignment
- CHOL + (i.e., exact match)
 - IRONMAN + 3-3E
 - J73C +
 - J73I + 2.2.3.1
 - PASCAL ?
 - PLI + 6.10.1, 6.10.2, 12.2
 - CS4 + 5.1.1.1, 3.6.3.2 (COPY parameters)
 - J3 + 2446.8
- 846 4 can specify relationships for parameter lengths
- CHOL -
 - IRONMAN o 7H, 7G
 - J73C -
 - J73I -
 - PASCAL -
 - PLI -
 - CS4 -
 - J3 -
- 847 4 match with actual parameters of other type
- CHOL -
 - IRONMAN - 3B
 - J73C -
 - J73I - 2.2.3.1, 1.7
 - PASCAL ?
 - PLI + 6.10.1, 6.10.2
 - CS4 -
 - J3 -

Character String Data Type

848 5 as in assignment

CHOL	+ (i.e., none)
IRONMAN	n
J73C	+ (i.e., none)
J73I	+ 2.2.3.1 (i.e., none)
PASCAL	?
PLI	+ 6.10.1, 6.10.2, 12.2
CS4	+ (i.e., none)
J3	+ 2446.8 (i.e., none)

849 3 function values

CHOL	+
IRONMAN	+ 7D
J73C	+
J73I	+ 2.2.2
PASCAL	+ 11
PLI	+ 12.21, 5.4.47, 6.7
CS4	+ 5.1
J3	+ 2432, 2485

850 4 single characters

CHOL	-
IRONMAN	+ 7D
J73C	-
J73I	-
PASCAL	+ 11
PLI	-
CS4	-
J3	-

851 4 character strings

CHOL	+
IRONMAN	+ 7D, 12D
J73C	+
J73I	+
PASCAL	- 11
PLI	+
CS4	+ 5.1
J3	+

852 5 efficiently returnable

CHOL	+
IRONMAN	+ 7D, 12D
J73C	+
J73I	?
PASCAL	n
PLI	?
CS4	?
J3	?

Character String Data Type

853 3 concatenate operation

CHOL	- 1.2.2
IRONMAN	+ 3-3E
J73C	- 1.2.2
J73I	-
PASCAL	-
PLI	+ 7.3.3
CS4	+ 3.6.4.2
J3	-

854 4 fixed length

CHOL	n
IRONMAN	+ 3-3E, 3-3D
J73C	n
J73I	n
PASCAL	n
PLI	+ 7.3.3
CS4	+ 3.6.4.2
J3	n

855 4 variable length

CHOL	n
IRONMAN	- 3-3E, 3-3D
J73C	n
J73I	n
PASCAL	n
PLI	+ 7.3.3
CS4	+ 3.6.4.2
J3	n

856 3 substring operation

CHOL	+ 1.2.2
IRONMAN	+ 3-3E
J73C	+ 1.2.2
J73I	+
PASCAL	-
PLI	+
CS4	+ 3.6.4.1
J3	+ 2428

857 4 fixed length

CHOL	+
IRONMAN	o [3-3E]
J73C	+
J73I	+ 4.10.5
PASCAL	n
PLI	+ 13.1.16
CS4	+ 3.6.4.1
J3	+ 2428

Character String Data Type

- 858 4 variable length
- | | |
|---------|-----------|
| CHOL | + |
| IRONMAN | o [3-3E] |
| J73C | + |
| J73I | + 4.10.5 |
| PASCAL | n |
| PLI | + 13.1.16 |
| CS4 | + 3.6.4.1 |
| J3 | + 2428 |
- 859 4 length defaultable to...
- | | |
|---------|----------|
| CHOL | o |
| IRONMAN | o [3-3E] |
| J73C | + |
| J73I | + |
| PASCAL | n |
| PLI | + |
| CS4 | - |
| J3 | + |
- 860 5 one
- | | |
|---------|---|
| CHOL | - (Separate Operation) |
| IRONMAN | + 3-3E (array accessing conventions used) |
| J73C | + |
| J73I | + 4.10.5 |
| PASCAL | n |
| PLI | - |
| CS4 | - |
| J3 | + 2428 |
- 861 5 end of string
- | | |
|---------|------------------------|
| CHOL | - (Separate Operation) |
| IRONMAN | - 3-3E |
| J73C | - |
| J73I | - |
| PASCAL | n |
| PLI | + 13.1.16 |
| CS4 | - |
| J3 | - |
- 862 5 default usage consistent with subroutine parameter conventions
- | | |
|---------|----------|
| CHOL | + |
| IRONMAN | o [3-3E] |
| J73C | - |
| J73I | - |
| PASCAL | n |
| PLI | - |
| CS4 | n |
| J3 | - |

Character String Data Type

863 5 default usage consistent with array indexing conventions

CHOL	+
IRONMAN	3-3E
J73C	-
J73I	-
PASCAL	n
PLI	-
CS4	n
J3	-

864 4 special syntax to identify substring

CHOL	o
IRONMAN	- 3-3E
J73C	-
J73I	-
PASCAL	n
PLI	-
CS4	-
J3	-

865 4 subscript range check

CHOL	+
IRONMAN	+ 10B, 13D
J73C	+ (if RESTRICTED)
J73I	- 4.10.5
PASCAL	n
PLI	+ 13.1.16, 10.4.14
CS4	+ 3.6.4.1
J3	- 2428

866 5 similar to array subscript range check

CHOL	+
IRONMAN	o [10B, 13D]
J73C	+
J73I	+ (i.e., none)
PASCAL	n
PLI	+ 10.4.14, 10.4.16
CS4	+ 3.6.4.1
J3	+ (i.e., none)

867 4 substrings permitted wherever strings permitted

CHOL	+
IRONMAN	+ 4D
J73C	+
J73I	+ 4.10.5, 4.11
PASCAL	n
PLI	+ 13.1.16, 12.2
CS4	+ 3.6.4.1
J3	+ 2428, 2433

Character String Data Type

868 5 as sources

CHOL	+
IRONMAN	+ 4D
J73C	+
J73I	+ 4.10.5
PASCAL	n
PLI	+ 13.1.16
CS4	+ 3.6.4.1
J3	+ 2428, 2433

869 5 as targets

CHOL	+
IRONMAN	o 4D
J73C	+
J73I	+ 4.11
PASCAL	n
PLI	+ 12.2
CS4	+ 3.6.4.1
J3	+ 2428

870 3 length function

CHOL	o
IRONMAN	o 7H, 1E
J73C	+
J73I	+ 4.10.10
PASCAL	-
PLI	+ 13.1.11
CS4	+ 3.6.2
J3	-

871 3 HIGH and LOW functions

CHOL	-
IRONMAN	o [3-2D, 3-3D, 3-3E]
J73C	-
J73I	-
PASCAL	-
PLI	+ 13.1.9, 13.1.12
CS4	-
J3	-

872 3 string replication functions...

CHOL	o
IRONMAN	+ 1B
J73C	-
J73I	-
PASCAL	-
PLI	+
CS4	-
J3	-

Character String Data Type

- 873 4 constant repetition factor
- | | |
|---------|----------------------|
| CHOL | + |
| IRONMAN | + 1E, 2H |
| J73C | n * |
| J73I | - |
| PASCAL | - |
| PLI | + 2.6.2.2 (literals) |
| CS4 | - |
| J3 | - |
- 874 4 variable repetition factor
- | | |
|---------|---|
| CHOL | - |
| IRONMAN | + 1E, 1A, 2H (for uniformity with constant repetition factor) |
| J73C | n * |
| J73I | - |
| PASCAL | - |
| PLI | + 13.1.7 (COPY function) |
| CS4 | - |
| J3 | - |
- 875 4 recursively embedded repetition
- | | |
|---------|--------------|
| CHOL | o |
| IRONMAN | - 1E, 1A, 2H |
| J73C | n * |
| J73I | - |
| PASCAL | - |
| PLI | + 13.1.7 |
| CS4 | - |
| J3 | - |
- 876 4 applied to literal strings only
- | | |
|---------|----------|
| CHOL | + |
| IRONMAN | + 1B, 2H |
| J73C | n * |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |

Character String Data Type

877 3 INDEX

CHOL - (Will be done by extension)
IRONMAN o [3-2D, 3-3D, 3-3E]
J73C - (will be done by extension)
J73I -
PASCAL -
PLI + 13.1.10
CS4 -
J3 -

878 3 BEFORE and AFTER

CHOL -
IRONMAN o [3-2D, 3-3D, 3-3E]
J73C -
J73I -
PASCAL -
PLI + 13.1.1, 13.1.2
CS4 -
J3 -

879 3 REVERSE

CHOL - (Will be done by extension)
IRONMAN o [3-2D, 3-3D, 3-3E]
J73C - (will be done by extension)
J73I -
PASCAL -
PLI + 13.1.13
CS4 -
J3 -

880 3 VERIFY

CHOL -
IRONMAN o [3-2D, 3-3D, 3-3E]
J73C -
J73I -
PASCAL -
PLI + 13.1.18
CS4 -
J3 -

881 3 pattern matching

CHOL -
IRONMAN o [3-2D, 3-3D, 3-3E]
J73C -
J73I -
PASCAL -
PLI -
CS4 -
J3 -

Character String Data Type

882 3 translate code

CHOL	-
IRONMAN	o [3-2D, 3-3D, 3-3E]
J73C	-
J73I	-
PASCAL	-
PLI	+ 13.1.17
CS4	-
J3	-

883 3 access to representations, BYTE_UNSPEC...

CHOL	-
IRONMAN	o [3-2D, 3-3D, 3-3E]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

884 4 function

CHOL	n *
IRONMAN	+ 4B
J73C	n
J73I	n (4.10.5)
PASCAL	n
PLI	n (except 13.1.15 STRING function for strings)
CS4	n
J3	n (2428, 2433)

885 4 pseudo-variable

CHOL	n *
IRONMAN	? 4B
J73C	n
J73I	n (4.10.5, 4.11)
PASCAL	n
PLI	n (except 12.2 STRING pseudo-variable for strings)
CS4	n
J3	n (2428)

886 3 relational operators

CHOL	+
IRONMAN	? 7A, 3-2D, 3-3E (by extension?)
J73C	+
J73I	+ 4.6, 5.2.2
PASCAL	+ 8.1.4
PLI	+ 7.3.4
CS4	+ 3.6.4.3
J3	+ 2437, 2439

Character String Data Type

- 887 4 equality/inequality
- CHOL +
 - IRONMAN ? 7A, 3-2D, 3-3E (by extension?)
 - J73C +
 - J73I + 4.6, 5.2.2
 - PASCAL + 8.1.4
 - PLI + 7.3.4
 - CS4 + 3.6.4.3
 - J3 + 2437.2, 2437.6-.7, 2439.1-.2
- 888 4 GRT, LES, GEQ, LEQ
- CHOL +
 - IRONMAN ? 7A, 3-2D, 3-3E (by extension?)
 - J73C +
 - J73I + 4.6, 5.2.2
 - PASCAL + 8.1.4
 - PLI + 7.3.4
 - CS4 -
 - J3 + 2437.2, 2437.6-.7 (transmission code only)
- 889 4 programmer-defined collating sequence
- CHOL + (Implied by chosen character set)
 - IRONMAN ? 3-2D, 3-2B
 - J73C + (implied by chosen character set)
 - J73I -
 - PASCAL -
 - PLI -
 - CS4 -
 - J3 - 2437.2
- 890 4 implicit lengthening in relational operation
- CHOL -
 - IRONMAN ?
 - J73C +
 - J73I + 4.6.2
 - PASCAL ? 8.1.4 (probably not)
 - PLI + 7.3.4.2
 - CS4 - 3.6.3.3
 - J3 + 2437.2
- 891 4 implicit truncating in relational operation
- CHOL -
 - IRONMAN - 1B
 - J73C -
 - J73I -
 - PASCAL ? 8.1.4 (probably not)
 - PLI -
 - CS4 - 3.6.3.3
 - J3 -

Character String Data Type

892	3	assignment	
		CHOL	+
		IRONMAN	+ 3-3E, 5F
		J73C	+
		J73I	+ 3.3
		PASCAL	+ 9.1.1
		PLI	+ 12.2
		CS4	+ 4.2, 3.6.3.2
		J3	+ 2442
893	4	built-in move operator	
		CHOL	-
		IRONMAN	- 3-3E
		J73C	-
		J73I	-
		PASCAL	-
		PLI	-
		CS4	-
		J3	-
894	4	infix operator	
		CHOL	+
		IRONMAN	+ 3-3E, 1E
		J73C	+
		J73I	+ 3.3
		PASCAL	+ 9.1.1
		PLI	+ 12.2
		CS4	+ 4.2, 3.6.3.2
		J3	+ 2442
895	4	implicit length conversion...	
		CHOL	o
		IRONMAN	o [3-3E, 5F]
		J73C	o
896	5	prohibited	
		CHOL	+
		IRONMAN	+ 3-3E, 3B
		J73C	-
		J73I	-
		PASCAL	+ 9.1.1
		PLI	-
		CS4	+ 3.6.3.2
		J3	-

Character String Data Type

- 897 5 truncation on right
- | | |
|---------|--------------|
| CHOL | - |
| IRONMAN | o [3-3E, 5F] |
| J73C | + |
| J73I | + 3.3, 1.7.2 |
| PASCAL | - |
| PLI | + 12.2 |
| CS4 | - |
| J3 | - |
- 898 5 truncation on left
- | | |
|---------|------------|
| CHOL | - |
| IRONMAN | - 3-3E, 3B |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | + 2442.4 |
- 899 5 length exception when source longer
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | o [3-3E, 5F] |
| J73C | + (if RESTRICTED) |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | + 3.6.3.2 |
| J3 | - |
- 900 5 length exception only if non-blanks
- | | |
|---------|--------------|
| CHOL | - |
| IRONMAN | o [3-3E, 5F] |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - 3.6.3.2 |
| J3 | - |
- 901 5 padding on right
- | | |
|---------|--------------|
| CHOL | - |
| IRONMAN | o [3-3E, 5F] |
| J73C | + |
| J73I | + 3.3, 1.7.2 |
| PASCAL | - |
| PLI | + 12.2 |
| CS4 | - |
| J3 | - |

Character String Data Type

902 5 padding on left

CHOL	-
IRONMAN	- 3-3E, 3B
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	+ 2442.4

903 4 implicit conversions to character

CHOL	-
IRONMAN	- 3B
J73C	-
J73I	- 1.7
PASCAL	- 9.1.1
PLI	+
CS4	-
J3	-

904 5 from integers

CHOL	n *
IRONMAN	n * 3B
J73C	n *
J73I	-
PASCAL	-
PLI	+ 8.2.7, 12.2
CS4	-
J3	-

905 5 from real

CHOL	n *
IRONMAN	n * 3B
J73C	n *
J73I	-
PASCAL	-
PLI	+ 8.2.7, 12.2
CS4	-
J3	-

906 5 from bit to base 2

CHOL	n *
IRONMAN	n * 3B
J73C	n *
J73I	-
PASCAL	n
PLI	+ 8.2.6, 12.2
CS4	n
J3	n

Character String Data Type

907 5 from bit to other base

CHOL	n *
IRONMAN	n * 3B
J73C	n *
J73I	-
PASCAL	n
PLI	-
CS4	n
J3	n

908 5 from others

CHOL	n *
IRONMAN	n * 3B
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

909 4 implicit replacement by a bit pattern (UNSPEC)

CHOL	-
IRONMAN	- 3B, 4B
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	+ 2442.4, 2433.3, 2418.5

910 3 expression evaluation...

CHOL	o [1.1.4, 1.2.2]
IRONMAN	o [3-2D, 3-3D, 3-3E]
J73C	o [1.1.4, 1.2.2]

911 4 implicit length conversion for some operations...

CHOL	o [1.1.4, 1.2.2]
IRONMAN	o [3-2D, 3-3D, 3-3E]
J73C	o [1.1.4, 1.2.2]

912 5 prohibited

CHOL	+
IRONMAN	+ 3B
J73C	-
J73I	-
PASCAL	+ 8.1.4
PLI	-
CS4	+ 3.6.3.3
J3	-

Character String Data Type

913	5	truncation on right	
		CHOL	-
		IRONMAN	-
		J73C	-
		J73I	-
		PASCAL	-
		PLI	-
		CS4	-
		J3	-
914	5	truncation on left	
		CHOL	-
		IRONMAN	-
		J73C	-
		J73I	-
		PASCAL	-
		PLI	-
		CS4	-
		J3	-
915	5	padding on right	
		CHOL	-
		IRONMAN	-
		J73C	+
		J73I	+ 1.7.2.1
		PASCAL	-
		PLI	+ 7.3.4.2
		CS4	-
		J3	-
916	5	padding on left	
		CHOL	-
		IRONMAN	-
		J73C	-
		J73I	-
		PASCAL	-
		PLI	-
		CS4	-
		J3	+ 2437.2
917	4	implicit conversion of operands	
		CHOL	-
		IRONMAN	- 3B
		J73C	-
		J73I	- 1.7.1
		PASCAL	- 8
		PLI	+ 8.2.6, 8.2.7
		CS4	-
		J3	-

Character String Data Type

- 918 5 as for assignment
- | | |
|---------|----------------------------|
| CHOL | + (i.e., none) |
| IRONMAN | + 3B (i.e., no conversion) |
| J73C | + (i.e., none) |
| J73I | + 3.3, 1.7 (i.e., none) |
| PASCAL | + (i.e., none) |
| PLI | + 12.2 |
| CS4 | + (i.e., none) |
| J3 | + (i.e., none) |
- 919 4 evaluation order of operands...
- | | |
|---------|----------------------|
| CHOL | o [1.1.4, 1.2.2] |
| IRONMAN | o [3-2D, 3-3D, 3-3E] |
| J73C | o [1.1.4, 1.2.2] |
| J3 | 2490-4 |
- 920 5 strictly left-to-right
- | | |
|---------|--------|
| CHOL | - |
| IRONMAN | - 4C |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | + 3.0 |
| J3 | + 2431 |
- 921 5 left-to-right within equal precedence
- | | |
|---------|------|
| CHOL | - |
| IRONMAN | - 4C |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 922 5 order not specified
- | | |
|---------|-----------|
| CHOL | + |
| IRONMAN | + 4C, 10E |
| J73C | + |
| J73I | + 4.8.3 |
| PASCAL | + 8 |
| PLI | + 7.1.4 |
| CS4 | - |
| J3 | - |

Character String Data Type

923 3 constant expression evaluation

CHOL	+
IRONMAN	+ 4E
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	+ 7.1
J3	-

924 4 concatenate

CHOL	n
IRONMAN	+ 3-3E, 4E
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	+ 7.1
J3	n

925 4 substring

CHOL	+
IRONMAN	+ 3-3E, 4E
J73C	+
J73I	-
PASCAL	n
PLI	-
CS4	-
J3	-

926 4 length function

CHOL	o
IRONMAN	o 7H, 4E, 1E
J73C	+
J73I	-
PASCAL	n
PLI	-
CS4	+ 3.6.2
J3	n

927 4 HIGH and LOW

CHOL	n
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

Character String Data Type

928 4 string replication

CHOL	+
IRONMAN	+ 1B
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

929 4 INDEX

CHOL	n
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

930 4 BEFORE and AFTER

CHOL	n
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

931 4 REVERSE

CHOL	n
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

932 4 VERIFY

CHOL	n
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

Character String Data Type

933	4	pattern matching	
		CHOL	n
		IRONMAN	n
		J73C	n
		J73I	n
		PASCAL	n
		PLI	n
		CS4	n
		J3	n
934	4	translate code	
		CHOL	n
		IRONMAN	n
		J73C	n
		J73I	n
		PASCAL	n
		PLI	-
		CS4	n
		J3	n
935	4	BYTE_UNSPEC	
		CHOL	n
		IRONMAN	? 4B
		J73C	n
		J73I	n
		PASCAL	n
		PLI	n
		CS4	n
		J3	n
936	4	relational operators	
		CHOL	+
		IRONMAN	n 4E
		J73C	+
		J73I	-
		PASCAL	-
		PLI	-
		CS4	+ 7.1
		J3	-
937	4	implicit conversions	
		CHOL	n
		IRONMAN	- 3B
		J73C	n
		J73I	n
		PASCAL	n
		PLI	-
		CS4	n
		J3	n

Character String Data Type

938 4 explicit conversions

CHOL	+
IRONMAN	? 4C
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	+ 7.1
J3	n

939 3 explicit conversion to character

CHOL	+ 1.1.4.1
IRONMAN	? 4C
J73C	+ 1.1.4.1
J73I	+
PASCAL	+
PLI	+
CS4	+ 3.6.4.4
J3	-

940 4 from integer to single character

CHOL	+ 1.1.4.1 (char(1))
IRONMAN	? 4C
J73C	+ 1.1.4.1 (char(1))
J73I	-
PASCAL	+ 11.1.3
PLI	-
CS4	-
J3	-

941 4 to character string...

CHOL	-
IRONMAN	? * [4C]
J73C	+ (BYTE_UNSPEC for scalar types)
J73I	+ 1.7.1.2.4 (BYTE_UNSPEC for scalar types)
PASCAL	-
PLI	+
CS4	+
J3	-

942 5 from integer

CHOL	n *
IRONMAN	? 4C
J73C	-
J73I	-
PASCAL	-
PLI	+ 13.1.5
CS4	+ 3.6.4.4
J3	-

Character String Data Type

943 5 from fixed real

CHOL	n
IRONMAN	? * [4C]
J73C	n
J73I	n
PASCAL	n
PLI	+ 13.1.5
CS4	+ 3.6.4.4
J3	-

944 5 from floating real

CHOL	n * (can be done by extension)
IRONMAN	? * [4C]
J73C	- (can be done by extension)
J73I	-
PASCAL	-
PLI	+ 13.1.5
CS4	+ 3.6.4.4
J3	-

945 5 from status

CHOL	n *
IRONMAN	? * [4C]
J73C	-
J73I	-
PASCAL	-
PLI	n
CS4	+ 3.6.4.4
J3	-

946 5 from boolean

CHOL	n *
IRONMAN	? * [4C]
J73C	-
J73I	n
PASCAL	-
PLI	n
CS4	+ 3.6.4.4
J3	-

947 5 from bit

CHOL	n *
IRONMAN	? * [4C]
J73C	-
J73I	-
PASCAL	n
FLI	+ 13.1.5
CS4	n
J3	n

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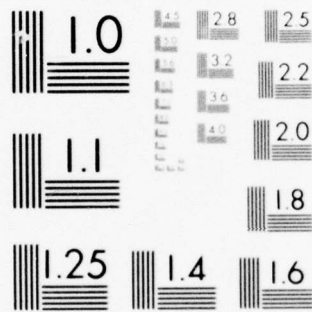
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Character String Data Type

948 5 from other types

CHOL	n *
IRONMAN	? * [4C]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

949 3 exception conditions

CHOL	+
IRONMAN	o [3-2D, 3-3D, 3-3E]
J73C	+
J73I	+
PASCAL	-
PLI	+
CS4	+
J3	-

950 4 conversion error

CHOL	+
IRONMAN	o [3-2D, 3-3D, 3-3E]
J73C	+
J73I	+ 1.7.1 (go to an error label)
PASCAL	-
PLI	+ 10.4.15 (stringsize condition)
CS4	+ 3.6.3.4
J3	-

951 4 subscript range (substring)

CHOL	+
IRONMAN	+ 10B, 13D, 3-3D
J73C	+ (if RESTRICTED)
J73I	- 4.10.5
PASCAL	-
PLI	+ 10.4.14
CS4	+ 3.6.4.1
J3	-

Pointer Data Type

952 2 Pointer Data Type

CHOL	+	1.2.4
IRONMAN	+	3-3I (references to heap-allocated objects)
J73C	+	1.2.4
J73I	+	
PASCAL	+	6.3
PLI	+	
CS4	-	
J3	-	

953 3 is declared/represented as integer

CHOL	-	
IRONMAN	-	3-3I
J73C	+	(untyped, unless RESTRICTED)
J73I	+	1.4, 4.10.6
PASCAL	-	6.3
PLI	-	5.4.40

954 3 representation...

CHOL	o	[1.2.4]
IRONMAN	.	3-3I
J73C	o	[1.2.4]

955 4 absolute

CHOL	+	
IRONMAN	o	[3-3I]
J73C	+	
J73I	+	1.4, 4.10.6
PASCAL	+	6.3
PLI	+	4.1.7, 5.4.40

956 4 relocatable (relative offset)

CHOL	-	(Use integer difference)
IRONMAN	o	[3-3I]
J73C	-	(use integer difference)
J73I	-	
PASCAL	-	
PLI	+	4.1.7, 5.4.35

957 4 only one representation

CHOL	+	
IRONMAN	o	[3-3I]
J73C	+	
J73I	+	
PASCAL	+	6.3
PLI	-	

Pointer Data Type

958 3 restrictions...

CHOL	o [1.2.4]
IRONMAN	o [3-31 (references to heap-allocated objects)]
J73C	o [1.2.4]

959 4 no restriction, pointer type doesn't specify pointed-to type

CHOL	- 1.2.4
IRONMAN	- 3-31
J73C	+ 1.2.4
J73I	+ 1.4
PASCAL	-
PLI	+ 4.1.7

960 4 type restriction, pointer type specifies pointed-to type

CHOL	+ 1.2.4
IRONMAN	+ 3-31
J73C	+ 1.2.4
J73I	-
PASCAL	+ 6.3, 7.3
PLI	-

961 3 constants...

CHOL	+
IRONMAN	. 3-31
J73C	+
J73I	+
PASCAL	+ 6.3 (nil)
PLI	-

962 4 NULL constant

CHOL	+
IRONMAN	o [3-31]
J73C	+
J73I	-
PASCAL	+ 6.3
PLI	+ 13.6.10, 13.6.11

963 4 compile-time ADDR

CHOL	+
IRONMAN	o [3-31]
J73C	+
J73I	-
PASCAL	-
PLI	-

Pointer Data Type

964 4 absolute (integer) address literals

CHOL +
IRONMAN o [3-3I]
J73C +
J73I + 1.4
PASCAL -
PLI -

965 4 mnemonic names can be specified

CHOL +
IRONMAN o [3-3I]
J73C +
J73I -
PASCAL ? 5, 6.3
PLI -

966 5 run-time values permitted

CHOL +
IRONMAN o [3-3I]
J73C +
J73I n
PASCAL - 5
PLI n

967 3 environmental parameter for number of bits in pointer

CHOL +
IRONMAN o 11C
J73C +
J73I + 1.2.2
PASCAL -
PLI -

968 3 variables

CHOL +
IRONMAN + 3-3I
J73C +
J73I - 4.11, 2.1.3, 2.1.4
PASCAL + 7
PLI + 4.1.3, 5.4.54, 6, 5.5

969 4 read-only access specifiable (in a subscope)

CHOL +
IRONMAN o 3-5B
J73C +
J73I n
PASCAL -
PLI -

Pointer Data Type

970 4 can specify constraints on access to object referenced

CHOL	+	(and their components)
IRONMAN	o	3-5B
J73C	+	(and their components)
J73I	n	
PASCAL	-	
PLI	-	

971 4 NULL value specifiable

CHOL	-	
IRONMAN	o	[3-3I]
J73C	-	
J73I	n	
PASCAL	-	
PLI	-	

972 4 undefined value exists

CHOL	-	
IRONMAN	o	[3-3I]
J73C	-	
J73I	n	
PASCAL	-	
PLI	-	

973 5 is specifiable

CHOL	n	
IRONMAN	o	[3-3I]
J73C	n	
J73I	n	
PASCAL	n	
PLI	n	

974 3 parameters

CHOL	+	
IRONMAN	+	3-3I, 7G
J73C	+	
J73I	-	2.2
PASCAL	+	10, 9.1.2, 11, 8.2
PLI	+	6.10

975 4 exact match

CHOL	+	
IRONMAN	o	[3-3I, 7G]
J73C	+	
J73I	n	
PASCAL	?	
PLI	-	6.10.1, 6.10.2

Pointer Data Type

- 976 4 safe match
- CHOL -
 - IRONMAN o [3-3I, 7G]
 - J73C -
 - J73I n
 - PASCAL ?
 - PLI - 6.10.1, 6.10.2
- 977 4 other matches
- CHOL -
 - IRONMAN o [3-3I, 7G]
 - J73C -
 - J73I n
 - PASCAL ?
 - PLI + 6.10.1, 6.10.2
- 978 3 function values
- CHOL +
 - IRONMAN + 7D
 - J73C +
 - J73I - 2.2.2
 - PASCAL + 11
 - PLI + 12.21, 5.4.47, 6.7
- 979 3 dereferencing...
- CHOL +
 - IRONMAN . 3-3I
 - J73C +
 - J73I +
 - PASCAL +
 - PLI +
- 980 4 implicit dereferencing
- CHOL -
 - IRONMAN o [3-3I]
 - J73C + (unless RESTRICTED)
 - J73I + 1.4
 - PASCAL -
 - PLI + 5.4.4, 6.6
- 981 4 explicit operator available
- CHOL +
 - IRONMAN o [3-3I]
 - J73C +
 - J73I + 1.4
 - PASCAL + 7.3
 - PLI + 6.6

Pointer Data Type

- 982 4 explicit dereferencing required
- CHOL +
 - IRONMAN o [3-3I]
 - J73C + (if RESTRICTED)
 - J73I - 1.4
 - PASCAL + 7.3
 - PLI -
- 983 4 type of pointed-to value determined by...
- CHOL o
 - IRONMAN o [3-3I]
 - J73C o
- 984 5 type of pointer value
- CHOL +
 - IRONMAN o [3-3I]
 - J73C + (for typed pointers)
 - J73I -
 - PASCAL + 6.3
 - PLI -
- 985 5 type of template (based) variable that qualifies pointer
- CHOL -
 - IRONMAN o [3-3I]
 - J73C + (for untyped pointers)
 - J73I + 1.4
 - PASCAL -
 - PLI + 6.6, 4.3.2.5
- 986 4 pointer valued operand
- CHOL +
 - IRONMAN o [3-3I]
 - J73C + (typed always, untyped if RESTRICTED)
 - J73I - (really is integer)
 - PASCAL + 7.3
 - PLI + 4.1.7, 6.6
- 987 4 integer or other-valued operand
- CHOL -
 - IRONMAN o [3-3I]
 - J73C + (untyped unless RESTRICTED)
 - J73I + 1.4 (integer only)
 - PASCAL -
 - PLI -

Pointer Data Type

- 988 4 (pointer) operand may be an expression
- | | |
|---------|-------------------------------|
| CHOL | + |
| IRONMAN | o [3-3I] |
| J73C | + |
| J73I | + 1.4 (an integer expression) |
| PASCAL | + 7.3 (except function calls) |
| PLI | + 6.6 |
- 989 3 add/subtract pointers and integers
- | | |
|---------|----------------------------|
| CHOL | + (Using special function) |
| IRONMAN | . 3-3I |
| J73C | + (using special function) |
| J73I | n (pointers are integers) |
| PASCAL | - |
| PLI | + 13.6.2 |
- 990 4 safely
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | o [3-3I] |
| J73C | + (if RESTRICTED) |
| J73I | - |
| PASCAL | n |
| PLI | - |
- 991 3 ADDR function
- | | |
|---------|---|
| CHOL | + |
| IRONMAN | o [3-3I (references to heap-allocated objects)] |
| J73C | + |
| J73I | + 4.10.6 |
| PASCAL | - |
| PLI | + 13.6.1 |
- 992 4 statically allocated objects
- | | |
|---------|----------|
| CHOL | + |
| IRONMAN | - 3-3I |
| J73C | + |
| J73I | + 4.10.6 |
| PASCAL | - |
| PLI | + 13.6.1 |
- 993 4 objects in automatic storage
- | | |
|---------|-----------------------|
| CHOL | - |
| IRONMAN | - 3-3I |
| J73C | + (unless RESTRICTED) |
| J73I | + 4.10.6 |
| PASCAL | - |
| PLI | + 13.6.1 |

Pointer Data Type

- 994 4 objects in heap storage
- CHOL +
 - IRONMAN + 3-3I
 - J73C +
 - J73I n
 - PASCAL + 10.1.2 (allocation procedure returns a pointer)
 - PLI + 13.6.1
- 995 4 all objects
- CHOL -
 - IRONMAN - 3-3I
 - J73C + (unless RESTRICTED)
 - J73I + 4.10.6
 - PASCAL -
 - PLI + 13.6.1 (connected storage only)
- 996 3 subtraction of pointers
- CHOL + (Using special function)
 - IRONMAN o [3-3I (references to heap-allocated objects)]
 - J73C + (using special function)
 - J73I n (pointers are integers)
 - PASCAL -
 - PLI -
- 997 3 relational operations
- CHOL +
 - IRONMAN o 3-3I
 - J73C +
 - J73I +
 - PASCAL +
 - PLI + 7.3.4
- 998 4 identity/non-identity of pointer values
- CHOL +
 - IRONMAN o [3-3I]
 - J73C +
 - J73I n 4.6, 5.2.2 (pointers are integers)
 - PASCAL + 6.3
 - PLI + 7.3.4.2
- 999 5 same symbol as for arithmetic equality
- CHOL +
 - IRONMAN o [3-3I]
 - J73C +
 - J73I + 4.6, 5.2.2
 - PASCAL + 6.3
 - PLI + 7.3.4

Pointer Data Type

- 1000 4 equality/inequality of pointed-to values
- CHOL + (Use dereferencing and compare base types)
 - IRONMAN o [3-3I]
 - J73C + (use dereferencing and compare base types)
 - J73I + 4.6, 5.2.2, 1.4
 - PASCAL + 7.3, 8.1.4
 - PLI + 6.6, 7.3.4
- 1001 5 same symbol as for arithmetic equality
- CHOL +
 - IRONMAN o [3-3I]
 - J73C +
 - J73I + 4.6, 5.2.2, 1.4
 - PASCAL + 8.1.4
 - PLI + 7.3.4
- 1002 4 algebraic comparisons of pointer values
- CHOL +
 - IRONMAN o [3-3I]
 - J73C +
 - J73I n 4.6, 5.2.2 (pointers are integers)
 - PASCAL - 6.3
 - PLI - 7.3.4.2
- 1003 3 assignment of pointer values
- CHOL +
 - IRONMAN o 3-3I, 5F
 - J73C +
 - J73I - 3.3
 - PASCAL + 9.1.1
 - PLI + 12.2
- 1004 4 exact match
- CHOL +
 - IRONMAN o [3-3I, 5F]
 - J73C +
 - J73I n
 - PASCAL + 9.1.1
 - PLI - 12.2
- 1005 4 safe match
- CHOL + (for variants)
 - IRONMAN o [3-3I, 5F]
 - J73C + (for variants)
 - J73I n
 - PASCAL -
 - PLI - 12.2

Pointer Data Type

1006	4	implicit conversion	
		CHOL	-
		IRONMAN	o [3-3I, 5F]
		J73C	-
		J73I	n
		PASCAL	-
		PLI	+ 12.2
1007	5	of representation (relative to absolute, etc.)	
		CHOL	n
		IRONMAN	o [3-3I, 5F]
		J73C	n
		J73I	n
		PASCAL	n
		PLI	+ 12.2, 8.2.1, 8.2.2
1008	5	from integer	
		CHOL	n *
		IRONMAN	o [3-3I, 5F]
		J73C	n *
		J73I	n
		PASCAL	-
		PLI	-
1009	5	from other	
		CHOL	n *
		IRONMAN	o [3-3I, 5F]
		J73C	n *
		J73I	n
		PASCAL	-
		PLI	-
1010	4	constrained by pointer lifetime	
		CHOL	-
		IRONMAN	- 3-3I, 3-3J
		J73C	-
		J73I	n
		PASCAL	-
		PLI	- 12.2, 4.1.7
1011	3	assignment of pointed-to objects...	
		CHOL	o [1.2.4]
		IRONMAN	+ 5F, 3-3I
		J73C	o [1.2.4]

Pointer Data Type

- 1012 4 normally by sharing
- CHOL -
 - IRONMAN o [5F, 3-3I]
 - J73C -
 - J73I -
 - PASCAL -
 - PLI - 12.2, 6.6
- 1013 4 explicit copy operator available
- CHOL + (done by dereferencing and ordinary assignment)
 - IRONMAN o [5F, 3-3I]
 - J73C + (done by dereferencing and ordinary assignment)
 - J73I + 3.3, 1.4
 - PASCAL + 9.1.1, 7.3
 - PLI + 12.2, 6.6
- 1014 4 programmer-defined copy operator
- CHOL -
 - IRONMAN o [5F, 3-3I]
 - J73C -
 - J73I -
 - PASCAL -
 - PLI -
- 1015 4 copy/sharing specified in object declaration
- CHOL -
 - IRONMAN o [5F, 3-3I]
 - J73C -
 - J73I -
 - PASCAL -
 - PLI -
- 1016 3 expression evaluation...
- CHOL o [1.2.4]
 - IRONMAN o [3-3I (references to heap-allocated objects)]
 - J73C o [1.2.4]
 - J73I -
- 1017 4 implicit conversion of operands
- CHOL -
 - IRONMAN o [3-3I (references to heap-allocated objects)]
 - J73C -
 - J73I n
 - PASCAL -
 - PLI + 6.6, 8.2.1, 8.2.2

Pointer Data Type

- 1018 5 as for assignment
- | | | |
|---------|---|---|
| CHOL | + | (i.e., none) |
| IRONMAN | o | [3-3I (references to heap-allocated objects)] |
| J73C | + | (i.e., none) |
| J73I | n | |
| PASCAL | + | (i.e., none) |
| PLI | + | 12.2 |
- 1019 4 evaluation order of operands...
- | | | |
|---------|---|---|
| CHOL | o | [1.2.4] |
| IRONMAN | o | [3-3I (references to heap-allocated objects)] |
| J73C | o | [1.2.4] |
| J73I | n | |
- 1020 5 strictly left-to-right
- | | | |
|---------|---|---|
| CHOL | - | |
| IRONMAN | o | [3-3I (references to heap-allocated objects)] |
| J73C | - | |
| J73I | n | |
| PASCAL | - | |
| PLI | - | |
- 1021 5 left-to-right within equal precedence
- | | | |
|---------|---|---|
| CHOL | - | |
| IRONMAN | o | [3-3I (references to heap-allocated objects)] |
| J73C | - | |
| J73I | n | |
| PASCAL | - | |
| PLI | - | |
- 1022 5 order not specified
- | | | |
|---------|---|---|
| CHOL | + | |
| IRONMAN | o | [3-3I (references to heap-allocated objects)] |
| J73C | + | |
| J73I | n | |
| PASCAL | + | 8 |
| PLI | + | 7.1.4 |
- 1023 3 constant expression evaluation
- | | | |
|---------|---|------|
| CHOL | + | |
| IRONMAN | o | 3-3I |
| J73C | + | |
| J73I | - | |
| PASCAL | - | |
| PLI | - | |

Pointer Data Type

1024	4	dereferencing	
		CHOL	+
		IRONMAN	o [3-3I]
		J73C	+
		J73I	-
		PASCAL	-
		PLI	-
1025	4	addition, subtraction	
		CHOL	+
		IRONMAN	o [3-3I]
		J73C	+
		J73I	n
		PASCAL	n
		PLI	-
1026	4	relational operations	
		CHOL	+
		IRONMAN	o [3-3I]
		J73C	+
		J73I	n
		PASCAL	-
		PLI	-
1027	4	conversions	
		CHOL	+
		IRONMAN	o [3-3I]
		J73C	+
		J73I	n
		PASCAL	n
		PLI	-
1028	3	explicit conversions	
		CHOL	+
		IRONMAN	o 3-3I
		J73C	+
		J73I	-
		PASCAL	-
		PLI	+
1029	4	of representation	
		CHOL	n
		IRONMAN	o [3-3I]
		J73C	n
		J73I	n
		PASCAL	n
		PLI	+ 13.6.12, 13.6.14.1

Pointer Data Type

1030	4	from integer	
		CHOL	+
		IRONMAN	o [3-3I]
		J73C	+
		J73I	n (pointers are integers)
		PASCAL	-
		PLI	+ 13.6.5, 13.6.14.2
1031	4	from other	
		CHOL	-
		IRONMAN	o [3-3I]
		J73C	-
		J73I	n
		PASCAL	-
		PLI	+ 13.6.5, 13.6.14.2 (bit string)
1032	3	exception conditions	
		CHOL	+
		IRONMAN	o 3-3I
		J73C	+
		J73I	-
		PASCAL	-
		PLI	-
1033	4	access exception	
		CHOL	+
		IRONMAN	o [3-3I]
		J73C	+ (if RESTRICTED)
		J73I	-
		PASCAL	-
		PLI	-

Label Data Type

1034 2 Label Data Type

CHOL	+
IRONMAN	+ 6G
J73C	+
J73I	+
PASCAL	+ 9, 9.1.3
PLI	+
CS4	+
J3	+

1035 3 implementation of a label value includes...

CHOL	o
IRONMAN	o [6G]
J73C	o

1036 4 instruction pointer

CHOL	+
IRONMAN	+ 6G
J73C	+
J73I	+ 4.10.6, 3.4, 3.2, 2.2.3.3, 2.6.1, 2.6.2
PASCAL	+ 9.1.3
PLI	+ 4.1.9
CS4	+ 4.0, 4.10
J3	+ 2440.3-.6, 2434.10

1037 4 environment pointer(s)

CHOL	-
IRONMAN	- 6G, 5D, 7B
J73C	-
J73I	-
PASCAL	+
PLI	+
CS4	?
J3	-

1038 5 block level (activation record)

CHOL	n *
IRONMAN	n * [6G, 5D, 7B]
J73C	n *
J73I	-
PASCAL	+ 9.1.3
PLI	+ 4.1.9
CS4	? 4.0, 4.10, 4.3
J3	-

Label Data Type

1039 5 expression level (work stack)

CHOL	n *
IRONMAN	n * [6G, 5D, 7B]
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1040 3 label constants

CHOL	+
IRONMAN	+ 6G
J73C	+
J73I	+
PASCAL	+
PLI	+
CS4	+
J3	+

1041 4 literals

CHOL	+
IRONMAN	o [6G]
J73C	+
J73I	+ 3.1, 3.2
PASCAL	+ 9
PLI	+ 2.5.1
CS4	+ 4.0
J3	+

1042 5 numeric only

CHOL	o
IRONMAN	- 1B
J73C	-
J73I	-
PASCAL	+ 9
PLI	-
CS4	-
J3	-

1043 5 alphanumeric

CHOL	o
IRONMAN	+ 1B
J73C	+
J73I	+ 3.1, 3.2
PASCAL	-
PLI	+ 2.5.1
CS4	+ 4.0
J3	+ 2440.3

Label Data Type

1044 5 must also be declared (on scope entry)

CHOL	o
IRONMAN	o [6G]
J73C	-
J73I	+ 2.3 (only if name declared in an outer scope)
PASCAL	+ 9.1.3.2, 10
PLI	- 5.2.3.2
CS4	-
J3	-

1045 4 mnemonic names can be specified

CHOL	-
IRONMAN	o [6G]
J73C	-
J73I	-
PASCAL	- 5
PLI	-
CS4	- 2.3
J3	-

1046 5 run-time values permitted

CHOL	n
IRONMAN	n 6G
J73C	n
J73I	n
PASCAL	n 5
PLI	n
CS4	n
J3	n

1047 3 label variables

CHOL	-
IRONMAN	- 6G, 5D
J73C	-
J73I	- 4.11, 2.1.3, 2.1.4
PASCAL	- 7
PLI	+ 4.1.3, 5.4.54, 6, 5.5
CS4	- 2.3
J3	- 2422, 2463-4

1048 4 basic capability (no checks)

CHOL	n *
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	+ 4.1.9, 12.2, 3.5
CS4	n
J3	n

Label Data Type

1049	4	basic capability (with values constrained)
		CHOL n *
		IRONMAN n
		J73C n
		J73I n
		PASCAL n
		PLI -
		CS4 n
		J3 n
1050	4	read-only access specifiable (in a subscope)
		CHOL n *
		IRONMAN n
		J73C n
		J73I n
		PASCAL n
		PLI -
		CS4 n
		J3 n
1051	4	NULL value specifiable
		CHOL n *
		IRONMAN n
		J73C n
		J73I n
		PASCAL n
		PLI -
		CS4 n
		J3 n
1052	4	undefined value exists
		CHOL n *
		IRONMAN n
		J73C n
		J73I n
		PASCAL n
		PLI -
		CS4 n
		J3 n
1053	5	is specifiable
		CHOL n *
		IRONMAN n
		J73C n
		J73I n
		PASCAL n
		PLI n
		CS4 n
		J3 n

Label Data Type

1054 3 label parameters
CHOL -
IRONMAN - 6G, 5D
J73C + (unless RESTRICTED)
J73I + 2.2, 2.2.3.3
PASCAL - 10, 9.1.2, 11, 8.2
PLI + 6.10
CS4 - 5.1.1
J3 + 2446, 2484

1055 3 function values
CHOL -
IRONMAN - 5D, 7D
J73C -
J73I - 2.2.2
PASCAL - 11
PLI + 12.21, 5.4.47, 6.7
CS4 - 5.1
J3 - 2432, 2485

1056 3 relational operations
CHOL -
IRONMAN n 5D, 6G
J73C -
J73I - 4.6, 5.2.2
PASCAL - 8.1.4
PLI + 7.3.4
CS4 -
J3 - 2437, 2439

1057 4 equality/inequality
CHOL n *
IRONMAN n
J73C n *
J73I - 4.6, 5.2.2
PASCAL - 8.1.4
PLI + 7.3.4.2
CS4 -
J3 -

1058 3 assignment
CHOL -
IRONMAN n 5D, 6G
J73C -
J73I - 3.3
PASCAL - 9.1.1
PLI + 12.2
CS4 - 4.2
J3 - 2442

Label Data Type

1059 4 constrained by lifetime

CHOL	n *
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	- 12.2
CS4	n
J3	n

1060 5 expression evaluation...

CHOL	-
IRONMAN	o [6G]
J73C	-
J73I	-
PASCAL	-
CS4	-

1061 4 designational expression

CHOL	n *
IRONMAN	- 5D
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	+

1062 5 conditional

CHOL	n *
IRONMAN	n * 5D
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1063 5 switches

CHOL	n *
IRONMAN	n * 6G
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	+ 2444, 2481-2

Label Data Type

1064	4	evaluation order of operands...	
		CHOL	n
		IRONMAN	o [6G]
		J73C	n
		J73I	n
		PASCAL	n
		CS4	n
		J3	2490-4
1065	5	strictly left-to-right	
		CHOL	n
		IRONMAN	n
		J73C	n
		J73I	n
		PASCAL	n
		PLI	-
		CS4	n
		J3	+ 2431
1066	5	left-to-right within equal precedence	
		CHOL	n
		IRONMAN	n
		J73C	n
		J73I	n
		PASCAL	n
		PLI	-
		CS4	n
		J3	-
1067	5	order not specified	
		CHOL	n
		IRONMAN	n
		J73C	n
		J73I	n
		PASCAL	n
		PLI	+ 7.1.4
		CS4	n
		J3	-
1068	3	constant expression evaluation	
		CHOL	-
		IRONMAN	n
		J73C	-
		J73I	-
		PASCAL	-
		PLI	-
		CS4	-
		J3	-

Label Data Type

1069 4 relational operations

CHOL	n
IRONMAN	n *
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

1070 3 exception conditions

CHOL	-
IRONMAN	n
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1071 4 environment not found

CHOL	n *
IRONMAN	n
J73C	n *
J73I	- 2.6.2.2.3
PASCAL	-
PLI	- 12.15
CS4	-
J3	-

1072 4 lifetime error (assignment)

CHOL	n *
IRONMAN	n
J73C	n *
J73I	-
PASCAL	-
PLI	- 12.2
CS4	-
J3	-

Procedure Data Type

1073 2 Procedure Data Type

CHOL	+ 2.3
IRONMAN	+ 7A
J73C	+ 2.3
J73I	+
PASCAL	+ 9.1.2, 8.2, 10, 11
PLI	+
CS4	+ 5
J3	+ 2446, 2484

1074 3 kinds of procedures...

CHOL	o [2.3]
IRONMAN	o [7A]
J73C	o [2.3]

1075 4 ordinary procedures

CHOL	+
IRONMAN	+ 7A
J73C	+
J73I	+ 2.2
PASCAL	+ 10, 11
PLI	+ 12.21, 3.6.2
CS4	+ 5
J3	+ 2484-5

1076 4 special "fast" internal procedures

CHOL	-
IRONMAN	- 1E, 7A
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	+ 2483

1077 3 positional parameters

CHOL	+
IRONMAN	o 7A
J73C	+
J73I	+
PASCAL	+
PLI	+
CS4	+
J3	+

Procedure Data Type

1078 4 fixed number of actual and formal parameters

CHOL	+
IRONMAN	o [7A]
J73C	+
J73I	+ 2.2, 3.10, 4.10
PASCAL	+ 10, 9.1.2
PLI	+ 6.10, 12.21, 5.4.17, 12.4
CS4	+ 5.1.1.1
J3	+ 2446, 2484

1079 4 optional parameters

CHOL	-
IRONMAN	o 7A, 12D
J73C	-
J73I	-
PASCAL	- 10, 2
PLI	-
CS4	-
J3	-

1080 5 omitted arguments only on end

CHOL	n *
IRONMAN	o [7A, 12D]
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	n
J3	n

1081 5 omitted arguments at any position

CHOL	n *
IRONMAN	o [7A, 12D]
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	n
J3	n

1082 6 markers may be used

CHOL	n *
IRONMAN	o [7A, 12D]
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	n
J3	n

Procedure Data Type

- 1083 5 actual arguments not type checked
- | | |
|---------|------|
| CHOL | n * |
| IRONMAN | - 7G |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | n |
| CS4 | n |
| J3 | n |
- 1084 5 optional/mandatory argument distinguished
- | | |
|---------|-------------|
| CHOL | n * |
| IRONMAN | o [7A, 12D] |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | n |
| CS4 | n |
| J3 | n |
- 1085 6 default value specifiable
- | | |
|---------|-------------|
| CHOL | n * |
| IRONMAN | o [7A, 12D] |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | n |
| CS4 | n |
| J3 | n |
- 1086 4 indefinite number of parameters
- | | |
|---------|---------|
| CHOL | - |
| IRONMAN | o [7A] |
| J73C | - |
| J73I | - |
| PASCAL | - 10, 2 |
| PLI | - |
| CS4 | - |
| J3 | - |
- 1087 5 all procedures have this capability implicitly
- | | |
|---------|--------|
| CHOL | n * |
| IRONMAN | o [7A] |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | n |
| CS4 | n |
| J3 | n |

Procedure Data Type

1088 5 indefiniteness is declared

CHOL n *

IRONMAN o [7A]

J73C n

J73I n

PASCAL n

PLI n

CS4 n

J3 n

1089 5 type of these parameters is uniform

CHOL n *

IRONMAN o [7A]

J73C n

J73I n

PASCAL n

PLI n

CS4 n

J3 n

1090 5 type of these parameters is fixed at compile-time

CHOL n *

IRONMAN o [7A]

J73C n

J73I n

PASCAL n

PLI n

CS4 n

J3 n

1091 3 keyword parameters

CHOL o

IRONMAN o 7A

J73C -

J73I -

PASCAL -

PLI -

CS4 + 5.1.1.1

J3 -

1092 4 required

CHOL -

IRONMAN o [7A]

J73C n

J73I n

PASCAL n

PLI n

CS4 -

J3 n

Procedure Data Type

1093	4	optional	
		CHOL	o
		IRONMAN	o [7A]
		J73C	n
		J73I	n
		PASCAL	n
		PLI	n
		CS4	+ 5.1.1.1
		J3	n
1094	5	default value specifiable	
		CHOL	o
		IRONMAN	o [7A]
		J73C	n
		J73I	n
		PASCAL	n
		PLI	n
		CS4	+ 5.1.1.1
		J3	n
1095	3	formal parameter access restrictions specifiable	
		CHOL	+
		IRONMAN	+ 7F
		J73C	+
		J73I	+ 2.2, 2.2.3
		PASCAL	+ 10, 9.1.2
		PLI	-
		CS4	+ 5.1.1.1
		J3	+
1096	4	for valueless procedures...	
		CHOL	o
		IRONMAN	o [7F]
		J73C	o
1097	5	read-only	
		CHOL	+
		IRONMAN	+ 7F
		J73C	+
		J73I	+ 2.2.1
		PASCAL	+ 9.1.2, 10
		PLI	-
		CS4	+ 5.1.1.1 (I parameters)
		J3	+ 2446, 2484

Procedure Data Type

1098 5	write-only	
	CHOL	+
	IRONMAN	+ 7F
	J73C	+
	J73I	+ 2.2.1
	PASCAL	-
	PLI	-
	CS4	+ 5.1.1.1 (0 parameters)
	J3	+ 2446, 2484
1099 5	read/write	
	CHOL	+
	IRONMAN	+ 7F
	J73C	+
	J73I	+ 2.2.1
	PASCAL	+ 9.1.2, 10
	PLI	+ 6.10
	CS4	+ 5.1.1.1 (10 parameters)
	J3	- 2489.10
1100 4	for functions...	
	CHOL	o
	IRONMAN	o [7F]
	J73C	o
1101 5	read-only	
	CHOL	+
	IRONMAN	+ 7E
	J73C	+
	J73I	+ 2.2.2 (simple items)
	PASCAL	+ 11, 10, 9.1.2
	PLI	-
	CS4	+ 5.1.1.1 (1 parameters)
	J3	+ 2485 (simple items)
1102 5	write-only	
	CHOL	+ (compiler detects use of output parameters in same expression)
	IRONMAN	- 7E
	J73C	+ (compiler detects use of output parameters in same expression)
	J73I	-
	PASCAL	-
	PLI	-
	CS4	+ 5.1.1.1 (0 parameters)
	J3	- 2485

Procedure Data Type

1103	5	read/write	
		CHOL	+ (compiler detects use of output parameters in same expression)
		IRONMAN	- 7E
		J73C	+ (compiler detects use of output parameters in same expression)
		J73I	+ 2.2.2 (tables, blocks)
		PASCAL	+ 11, 10, 9.1.2
		PLI	+ 6.10
		CS4	+ 5.1.1.1 (10 parameters)
		J3	+ 2485 (tables, arrays)
1104	4	access constraints distinguished...	
		CHOL	+
		IRONMAN	o [7F]
		J73C	+
		J73I	+
		PASCAL	+
		PLI	-
		CS4	+
		J3	+
1105	5	in form of call	
		CHOL	o
		IRONMAN	o [7F]
		J73C	+
		J73I	+ 3.10
		PASCAL	-
		PLI	-
		CS4	-
		J3	+ 2446.6
1106	5	in declaration of formal parameter	
		CHOL	+
		IRONMAN	o [7F]
		J73C	+
		J73I	+ 2.2.1
		PASCAL	+ 10, 9.1.2
		PLI	-
		CS4	+ 5.1.1.1, 5.1.1.1
		J3	+ 2484.6

Procedure Data Type

1107 3 ability to restrict relations among writable parameters

CHOL +
IRONMAN + 7E, 7I
J73C + (if RESTRICTED)
J73I -
PASCAL -
PLI -
CS4 -
J3 -

1108 4 duplicate actual parameters forbidden

CHOL +
IRONMAN + 7E, 7I
J73C + (if RESTRICTED)
J73I -
PASCAL -
PLI -
CS4 -
J3 -

1109 4 address overlap forbidden among parameters

CHOL - (but reported if compiler can detect)
IRONMAN + 7E, 7I
J73C - (but reported if compiler can detect)
J73I -
PASCAL -
PLI -
CS4 -
J3 -

1110 4 address overlap forbidden among parameters and global data

CHOL - (but reported if compiler can detect)
IRONMAN + 7E, 7I
J73C - (but reported if compiler can detect)
J73I -
PASCAL -
PLI -
CS4 -
J3 -

1111 3 ability to specify relations among parameters

CHOL -
IRONMAN ? 7H, 12D
J73C -
J73I -
PASCAL -
PLI -
CS4 -
J3 -

Procedure Data Type

- 1112 3 call always checked against...
- CHOL o [2.3]
 - IRONMAN o [7A]
 - J73C o [2.3]
- 1113 4 compool declaration
- CHOL +
 - IRONMAN + 12B, 7G
 - J73C +
 - J73I + 3.10, 4.10, 2.6.3
 - PASCAL n
 - PLI n
 - CS4 + 7.3.1, 5.2
 - J3 + 2460, 2446.7
- 1114 4 external declaration
- CHOL -
 - IRONMAN - 12B, 7G
 - J73C +
 - J73I + 3.10, 4.10, 2.6.2
 - PASCAL + 9.1.2, 8.2, 13, U13.A.2
 - PLI + 5.4.19, 12.4, 6.7, 6.10
 - CS4 n
 - J3 n
- 1115 4 (internal) procedure definition
- CHOL +
 - IRONMAN + 7G
 - J73C +
 - J73I + 3.10, 4.10, 2.2
 - PASCAL + 9.1.2, 8.2, 10, 11
 - PLI + 12.4, 6.7, 6.10, 12.21
 - CS4 + 5
 - J3 + 2446.7, 2484
- 1116 3 compool or external declaration checked against procedure definition
- CHOL +
 - IRONMAN + 7G
 - J73C + (if RESTRICTED)
 - J73I - 2.6.2.2.4
 - PASCAL -
 - PLI -
 - CS4 + 7.3.1
 - J3 ? 2460

Procedure Data Type

1117 3 parameter transmission methods

CHOL	o [2.3]
IRONMAN	. 7F
J73C	o [2.3]
J73I	2.2.3
PASCAL	2, 9.1.2, 10, 11
PLI	6.10
CS4	5.1.1.1
J3	2446, 2484

1118 4 call by value (constant)

CHOL	o
IRONMAN	o [7F]
J73C	o
J73I	-
PASCAL	-
PLI	-
CS4	+ 5.1.1.1 (COPYI parameters)
J3	-

1119 5 for aggregates

CHOL	-
IRONMAN	o [7F]
J73C	-
J73I	n
PASCAL	n
PLI	n
CS4	+ 5.1.1.1
J3	n

1120 4 call by value (variable)

CHOL	-
IRONMAN	o [7F]
J73C	+
J73I	+ 2.2.3.1
PASCAL	+ 9.1.2, 10
PLI	+ 6.10.1, 6.10.2
CS4	-
J3	+ 2446.8

1121 5 simulated by pointer parameter and local generator argument

CHOL	n *
IRONMAN	o [7F]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	n
J3	-

Procedure Data Type

1122 5 simulated by call by reference with a dummy argument

CHOL n *
IRONMAN o [7F]
J73C -
J73I -
PASCAL -
PLI + 6.10.1
CS4 n
J3 -

1123 5 for aggregates

CHOL n *
IRONMAN o [7F]
J73C -
J73I - 2.2.3.2
PASCAL + 9.1.2, 10
PLI + 6.10.1, 6.10.2
CS4 n
J3 - 2446.7

1124 4 call by reference

CHOL o
IRONMAN o [7F]
J73C +
J73I + 2.2.3.2
PASCAL + 9.1.2, 10
PLI + 6.10.1
CS4 + 5.1.1.1 (REFIO parameters)
J3 + 2446.7

1125 5 simulated by pointer parameter and argument

CHOL -
IRONMAN o [7F]
J73C -
J73I -
PASCAL -
PLI -
CS4 -
J3 -

1126 5 for aggregates

CHOL +
IRONMAN o [7F]
J73C +
J73I + 2.2.3.2
PASCAL + 9.1.2, 10
PLI + 6.10.1
CS4 + 5.1.1.1
J3 + 2446.7

Procedure Data Type

- 1127 4 call by value/reference implementation defined (read-only params)
- | | |
|---------|-----------------------------|
| CHOL | + |
| IRONMAN | o [7F] |
| J73C | + |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | + 5.1.1.1 (REFI parameters) |
| J3 | - |
-
- 1128 4 call by name
- | | |
|---------|--------------------------------------|
| CHOL | - |
| IRONMAN | - 7F, 5D |
| J73C | - |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | + 5.1.1.1 (NAMEI, NAMEIO parameters) |
| J3 | - |
-
- 1129 5 simulated by procedure parameter and argument
- | | |
|---------|------------|
| CHOL | n * |
| IRONMAN | n * 7F, 5D |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | n |
| CS4 | - |
| J3 | n |
-
- 1130 5 call by simple name and name not distinguished
- | | |
|---------|------------|
| CHOL | n * |
| IRONMAN | n * 7F, 5D |
| J73C | n |
| J73I | n |
| PASCAL | n |
| PLI | n |
| CS4 | + 5.1.1.1 |
| J3 | n |
-
- 1131 4 call by result
- | | |
|---------|------------------------------|
| CHOL | - |
| IRONMAN | - 7F |
| J73C | + (unless RESTRICTED) |
| J73I | + 2.2.3.1 |
| PASCAL | - |
| PLI | - |
| CS4 | + 5.1.1.1 (COPYO parameters) |
| J3 | + 2446.8 |

Procedure Data Type

1132 5 for aggregates

CHOL n *
IRONMAN n
J73C -
J73I - 2.2.3.2
PASCAL n
PLI n
CS4 + 5.1.1.1
J3 - 2446.7

1133 4 call by value/result

CHOL o
IRONMAN + 7F
J73C + (unless RESTRICTED)
J73I + 2.2.3.1
PASCAL -
PLI -
CS4 + 5.1.1.1 (COPYIO parameters)
J3 -

1134 4 call by value, reference, and value/result

CHOL o
IRONMAN + 7F
J73C + (unless RESTRICTED)
J73I + 2.2.3
PASCAL -
PLI -
CS4 + 5.1.1.1 (COPYI, REFIO, COPYIO)
J3 -

1135 4 linkage conventions are programmer-specifiable

CHOL +
IRONMAN o [7F]
J73C +
J73I -
PASCAL -
PLI -
CS4 -
J3 -

1136 3 can specify storage class of formal parameter (static, auto, based)

CHOL -
IRONMAN o [7A]
J73C + (unless RESTRICTED)
J73I + 2.2.3.1
PASCAL -
PLI - 6.10.4
CS4 -
J3 -

Procedure Data Type

1137 3	reentrancy	
	CHOL	+
	IRONMAN	o 7A, 9A
	J73C	+
	J73I	+ 1.4
	PASCAL	-
	PLI	?
	CS4	+ 2.3.3, II.3, II.4
	J3	-
1138 4	default is...	
	CHOL	o
	IRONMAN	. 7A, 9A
	J73C	o
1139 5	reentrant	
	CHOL	o
	IRONMAN	?
	J73C	-
	J73I	-
	PASCAL	-
	PLI	?
	CS4	+ 2.3.3, II.3, II.4
	J3	-
1140 5	non-reentrant	
	CHOL	o
	IRONMAN	?
	J73C	+
	J73I	+ 1.4.2
	PASCAL	+
	PLI	?
	CS4	-
	J3	+
1141 4	reentrant/non-reentrant attribute specifiable	
	CHOL	+
	IRONMAN	o [7A, 9A]
	J73C	+
	J73I	+ 1.4, 2.2
	PASCAL	-
	PLI	-
	CS4	-
	J3	-

Procedure Data Type

1142 4 reentrant/non-reentrant attribute required

CHOL	+
IRONMAN	o [7A, 9A]
J73C	-
J73I	-
PASCAL	n
PLI	n
CS4	n
J3	n

1143 4 writable local static variables permitted in reentrant code

CHOL	-
IRONMAN	- 3-5C
J73C	+ (unless RESTRICTED)
J73I	+ 1.4
PASCAL	n
PLI	?
CS4	?
J3	n

1144 3 recursion

CHOL	+
IRONMAN	+ 7B
J73C	+
J73I	+ 1.4
PASCAL	+ 10, 11
PLI	+ 12.21
CS4	- 5.1
J3	-

1145 4 default is...

CHOL	o
IRONMAN	o [7B]
J73C	o

1146 5 recursive

CHOL	-
IRONMAN	o [7B]
J73C	-
J73I	-
PASCAL	+ 10, 11
PLI	+ 12.21
CS4	-
J3	-

Procedure Data Type

1147 5	non-recursive	
	CHOL	+
	IRONMAN	o [7B]
	J73C	+
	J73I	+ 1.4.2
	PASCAL	-
	PLI	-
	CS4	+ 5.1
	J3	+ 2484.9, 2485.5, 2483
1148 4	recursive/non-recursive attribute specifiable	
	CHOL	+
	IRONMAN	+ 7B
	J73C	+
	J73I	+ 1.4, 2.2
	PASCAL	-
	PLI	+ 12.21
	CS4	-
	J3	-
1149 4	recursive/non-recursive attribute required	
	CHOL	--
	IRONMAN	o [7B]
	J73C	-
	J73I	-
	PASCAL	n
	PLI	-
	CS4	n
	J3	n
1150 4	restrict rec. procs. to allow efficient implementation (no display)	
	CHOL	+
	IRONMAN	+ 7B
	J73C	+
	J73I	- 1.4, 2.2, 2.6.2.2
	PASCAL	- 10, 11
	PLI	- 12.21, 3.3.2
	CS4	n (no recursive procedures)
	J3	n 2484.9, 2485.5 (no recursive procedures)
1151 3	alternate entry points	
	CHOL	-
	IRONMAN	- 1A, 7A
	J73C	-
	J73I	-
	PASCAL	-
	PLI	+ 12.11
	CS4	-
	J3	-

Procedure Data Type

1152 4 same parameters and returned value type required

CHOL	n *
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

1153 4 different parameters and returned values permitted

CHOL	n *
IRONMAN	n
J73C	n
J73I	n
PASCAL	n
PLI	+ 12.11, 12.21
CS4	n
J3	n

1154 3 mode of call...

CHOL	o [2.3]
IRONMAN	o [7A]
J73C	o [2.3]

1155 4 closed

CHOL	+
IRONMAN	+ 7A
J73C	+
J73I	+ 2.2, 3.10, 4.10
PASCAL	+ 9.1.2, 8.2, 10, 11, 2
PLI	+ 3.6.2
CS4	+ 5.1.2
J3	+ 2484, 2483.2

1156 4 inline

CHOL	+
IRONMAN	+ 11F, 12D, 7A
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	+ 5.1.2
J3	-

Procedure Data Type

- 1157 5 with compile-time constant evaluation
- | | |
|---------|--------------|
| CHOL | + |
| IRONMAN | + 12D, 11F |
| J73C | + |
| J73I | n |
| PASCAL | n |
| PLI | n |
| CS4 | + 5.1.2, 7.1 |
| J3 | n |
- 1158 5 formal parameter attributes completely specified
- | | |
|---------|----------------|
| CHOL | + (optionally) |
| IRONMAN | + 12D, 11F |
| J73C | + (optionally) |
| J73I | n |
| PASCAL | n |
| PLI | n |
| CS4 | + 5.1.2 (OPEN) |
| J3 | n |
- 1159 5 formal parameter attributes completed by actual parameter attributes
- | | |
|---------|-----------------|
| CHOL | + |
| IRONMAN | + 12D, 11F |
| J73C | + |
| J73I | n |
| PASCAL | n |
| PLI | n |
| CS4 | + 5.1.2 (MOPEN) |
| J3 | n |
- 1160 3 definable special entry and exit sequences
- | | |
|---------|-------|
| CHOL | + |
| IRONMAN | o 11F |
| J73C | + |
| J73I | - |
| PASCAL | - |
| PLI | - |
| CS4 | - |
| J3 | - |
- 1161 3 reducible functions specifiable...
- | | |
|---------|---------|
| CHOL | o [2.3] |
| IRONMAN | o [7A] |
| J73C | o [2.3] |

Procedure Data Type

1162 4 by declaration

CHOL	o
IRONMAN	? 1D, 1F, 11F
J73C	+
J73I	+ 6.5
PASCAL	-
PLI	+ 5.4.46, 12.11, 12.21
CS4	+ 5.1.2
J3	-

1163 4 by analysis of function's use of global and local data

CHOL	-
IRONMAN	? 7I, 7E, 11F
J73C	-
J73I	-
PASCAL	?
PLI	-
CS4	-
J3	? 2431.2

1164 3 implementation of a procedure value includes...

CHOL	o [2.3]
IRONMAN	o [7A]
J73C	o [2.3]

1165 4 instruction pointer

CHOL	+
IRONMAN	+ 7A
J73C	+
J73I	+ 4.10.6, 3.10, 4.10, 2.2, 2.2.3.4, 2.6.1, 2.6.2
PASCAL	+ 2, 9.1.2, 8.2, 10, 11
PLI	+ 4.1.11
CS4	+ 5.2, 5.1
J3	+ 2446, 2484, 2483

1166 4 environment pointer(s)

CHOL	- (need for env-pointer is forbidden)
IRONMAN	- 5D, 7B
J73C	- (need for env-pointer is forbidden)
J73I	-
PASCAL	+
PLI	+
CS4	?
J3	-

Procedure Data Type

1167 5 block level (activation record)

CHOL	n *
IRONMAN	n * [5D, 7B]
J73C	n *
J73I	-
PASCAL	+ 2, 9.1.2, 8.2, 10, 11
PLI	+ 4.1.11
CS4	?
J3	-

1168 5 expression level (work stack)

CHOL	n *
IRONMAN	n * [5D, 7B]
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1169 3 function returns value...

CHOL	o [2.3]
IRONMAN	. 7A
J73C	o [2.3]

1170 4 by assignment to function name

CHOL	-
IRONMAN	o [7A]
J73C	+
J73I	+ 2.2.2.2
PASCAL	+ 9.1.1, 11
PLI	-
CS4	-
J3	+ 2485.3

1171 4 by RETURN statement

CHOL	+
IRONMAN	o [7A]
J73C	-
J73I	-
PASCAL	-
PLI	+ 3.6.2, 12.24
CS4	+ 4.9
J3	-

Procedure Data Type

1172 4 as value of last statement/expression executed

CHOL	-
IRONMAN	o [7A]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1173 3 control returns to invoker...

CHOL	o [2.3]
IRONMAN	. 7A
J73C	o [2.3]

1174 4 for valueless procedures...

CHOL	o [2.3]
IRONMAN	. 7A
J73C	o [2.3]

1175 5 explicitly by RETURN statement

CHOL	o
IRONMAN	o [7A]
J73C	+
J73I	+ 3.6
PASCAL	-
PLI	+ 3.6.2, 12.24
CS4	+ 4.9
J3	+ 2484.11, 2445.3

1176 5 implicitly after executing last statement

CHOL	+
IRONMAN	o [7A]
J73C	+
J73I	+ 2.2
PASCAL	+ 2, 9.1.2, 10
PLI	+ 3.6.2, 12.10
CS4	+ 5.2
J3	+ 2484.11, 2483.2

1177 4 for functions...

CHOL	o [2.3]
IRONMAN	. 7A
J73C	o [2.3]

Procedure Data Type

- 1178 5 explicitly by RETURN statement
- | | | |
|---------|---|--|
| CHOL | + | (But could be required to be last statement) |
| IRONMAN | o | [7A] |
| J73C | + | (but could be required to be last statement) |
| J73I | + | 3.6 |
| PASCAL | - | |
| PLI | + | 3.6.2, 12.24 |
| CS4 | + | 4.9 |
| J3 | + | 2445.3 |
- 1179 5 implicitly after executing last statement
- | | | |
|---------|---|-----------------------|
| CHOL | - | |
| IRONMAN | o | [7A] |
| J73C | + | |
| J73I | + | 2.2 |
| PASCAL | + | 2, 8.2, 11, 9.1.2, 10 |
| PLI | - | 3.6.2, 12.10 |
| CS4 | - | 5.2 |
| J3 | + | 2485 |
- 1180 3 constants
- | | | |
|---------|---|------|
| CHOL | + | |
| IRONMAN | o | [7A] |
| J73C | + | |
| J73I | + | |
| PASCAL | + | |
| PLI | + | |
| CS4 | + | |
| J3 | + | |
- 1181 4 literals
- | | | |
|---------|---|--------------|
| CHOL | + | |
| IRONMAN | o | [7A] |
| J73C | + | |
| J73I | + | 2.2 |
| PASCAL | + | 10, 11 |
| PLI | + | 2.2, 12.21 |
| CS4 | + | 5.1 |
| J3 | + | 2484-5, 2483 |
- 1182 5 formal parameter types and attributes...
- | | | |
|---------|---|----|
| CHOL | + | |
| IRONMAN | + | 7G |
| J73C | + | |

Procedure Data Type

- 1183 6 specified in formal parameter list
- CHOL o
 - IRONMAN o [7G]
 - J73C -
 - J73I -
 - PASCAL + 10, 11
 - PLI -
 - CS4 + 5.1.1
 - J3 -
- 1184 6 specified in separate declarations
- CHOL o
 - IRONMAN o [7G]
 - J73C +
 - J73I + 2.2.1.1, 2.2.2.1
 - PASCAL -
 - PLI + 2.2.12.21
 - CS4 -
 - J3 + 2484.6, 2485.1
- 1185 6 syntax essentially same as for variable or constant declarations
- CHOL o
 - IRONMAN o [7G]
 - J73C +
 - J73I + 2.2.3
 - PASCAL + 10, 7
 - PLI + 5
 - CS4 + 5.1.1, 2.3
 - J3 + 2484.1
- 1186 5 procedure body delimited by...
- CHOL o
 - IRONMAN o [7A]
 - J73C o
- 1187 6 compound statement
- CHOL o
 - IRONMAN o 2D
 - J73C +
 - J73I + 2.2.1.1, 2.2.2.1
 - PASCAL + 10
 - PLI -
 - CS4 -
 - J3 + 2484.7, 2483.1

Procedure Data Type

1188 6	required delimiter
	CHOL o
	IRONMAN o 2D
	J73C -
	J73I -
	PASCAL -
	PLI + 2.2, 12.10
	CS4 + 5.1
	J3 -
1189 7	keyed to procedure name
	CHOL +
	IRONMAN o [2D]
	J73C n
	J73I n
	PASCAL n
	PLI + 12.10
	CS4 + 5.1
	J3 n
1190 8	name optional
	CHOL -
	IRONMAN o [2D]
	J73C n
	J73I n
	PASCAL n
	PLI + 12.10
	CS4 + 5.1
	J3 n
1191 8	name required
	CHOL +
	IRONMAN o [2D]
	J73C n
	J73I n
	PASCAL n
	PLI -
	CS4 -
	J3 n
1192 7	multiple closure permitted
	CHOL -
	IRONMAN - 2D
	J73C n
	J73I n
	PASCAL n
	PLI + 2.4
	CS4 - 5.1
	J3 n

Procedure Data Type

1193 4 mnemonic names can be specified

CHOL	+
IRONMAN	+ 2E
J73C	+
J73I	+ 2.2.1.2, 2.2.2.2
PASCAL	+ 10, 11
PLI	+ 12.21, 5.2.3.2.3
CS4	+ 5.1
J3	+ 2484.6, 2483.1

1194 5 run-time values permitted

CHOL	+
IRONMAN	- 5D
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1195 3 procedure variables

CHOL	+
IRONMAN	- 5D
J73C	+
J73I	- 4.11, 2.1.3, 2.1.4
PASCAL	- 7
PLI	+ 4.1.3, 5.4.54, 6, 5.5
CS4	- 2.3
J3	- 2422, 2463-4

1196 4 read-only access specifiable (in a subscope)

CHOL	+
IRONMAN	n
J73C	+
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

1197 4 NULL value specifiable

CHOL	-
IRONMAN	n
J73C	-
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

Procedure Data Type

1198 4	undefined value exists	
	CHOL	-
	IRONMAN	n
	J73C	-
	J73I	n
	PASCAL	n
	PLI	-
	CS4	n
	J3	n
1199 5	is specifiable	
	CHOL	n
	IRONMAN	n
	J73C	n
	J73I	n
	PASCAL	n
	PLI	n
	CS4	n
	J3	n
1200 3	procedures can be passed as parameters	
	CHOL	+
	IRONMAN	- 5D
	J73C	+
	J73I	+ 2.2, 2.2.3.4
	PASCAL	+ 10, 9.1.2, 11, 8.2
	PLI	+ 6.10
	CS4	+ 5.1.1.2
	J3	- 2446, 2484 (except close routines)
1201 4	exact match required	
	CHOL	+
	IRONMAN	n
	J73C	+ (if RESTRICTED)
	J73I	-
	PASCAL	?
	PLI	- 6.10.1, 6.10.2
	CS4	+ 5.1.1.2
	J3	n
1202 4	safe match permitted	
	CHOL	-
	IRONMAN	n
	J73C	+ (unless RESTRICTED)
	J73I	+ 2.2.3.4, 1.7 (as in assignment)
	PASCAL	?
	PLI	- 6.10.1, 6.10.2
	CS4	-
	J3	n

Procedure Data Type

1203 4 specification of parameter attributes of formal procedure parameters

CHOL	+
IRONMAN	n
J73C	+
J73I	+
PASCAL	-
PLI	+
CS4	+
J3	n

1204 5 required

CHOL	+
IRONMAN	n
J73C	+
J73I	+ 2.2.3.4
PASCAL	-
PLI	-
CS4	+ 5.1.1.2
J3	n

1205 5 optional

CHOL	-
IRONMAN	n
J73C	-
J73I	-
PASCAL	-
PLI	+ 6.10.1
CS4	-
J3	n

1206 5 prohibited

CHOL	-
IRONMAN	n
J73C	-
J73I	-
PASCAL	+ 10
PLI	-
CS4	-
J3	n

1207 4 specification of result attributes of formal procedure parameters

CHOL	+
IRONMAN	n
J73C	+
J73I	+
PASCAL	+
PLI	+
CS4	+
J3	n

Procedure Data Type

1208	5	required	
		CHOL	+
		IRONMAN	n
		J73C	+
		J73I	+ 2.2.3.4
		PASCAL	+ 10
		PLI	-
		CS4	+ 5.1.1.2
		J3	n
1209	5	optional	
		CHOL	-
		IRONMAN	n
		J73C	-
		J73I	-
		PASCAL	-
		PLI	+ 6.10.1
		CS4	-
		J3	n
1210	4	implicit conversion to procedure	
		CHOL	-
		IRONMAN	n
		J73C	-
		J73I	-
		PASCAL	-
		PLI	-
		CS4	-
		J3	n
1211	3	functions can return procedure values...	
		CHOL	+
		IRONMAN	- 5D
		J73C	+
		J73I	- 2.2.2
		PASCAL	- 11
		PLI	+ 5.4.47, 6.7
		CS4	- 5.1
		J3	- 2485
1212	4	choose from among existing procedure bodies	
		CHOL	+
		IRONMAN	n
		J73C	+
		J73I	n
		PASCAL	n
		PLI	+ 4.1.11
		CS4	n
		J3	n

Procedure Data Type

1213 4 bind certain formal parameters

CHOL	-
IRONMAN	+ 12D
J73C	-
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

1214 4 return functions of functions

CHOL	-
IRONMAN	n
J73C	-
J73I	n
PASCAL	n
PLI	- 4.1.11
CS4	n
J3	n

1215 4 scope (lexical or lifetime) restriction on returnable values

CHOL	+
IRONMAN	n
J73C	+
J73I	n
PASCAL	n
PLI	- 4.1.11
CS4	n
J3	n

1216 3 lefthand-side functions...

CHOL	+
IRONMAN	o [7A]
J73C	-
J73I	-
PASCAL	- 9.1.1
PLI	-
CS4	- 5.1, 4.2
J3	-

Procedure Data Type

1217 4 return lefthand-side values

CHOL	-
IRONMAN	- 7A, 3-3I (pointers restricted to dynamically allocated data)
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1218 4 called with optional argument (as in AED)

CHOL	-
IRONMAN	- 7A
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1219 4 defined as assignment operation associated with data object

CHOL	+
IRONMAN	+ 7A, 3-5B (assignment operation is a procedure, not a function)
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	+ 6.1.3
J3	-

1220 3 invocation operation

CHOL	+
IRONMAN	. 7A
J73C	+
J73I	+ 3.10, 4.10
PASCAL	+ 9.1.2, 8.2
PLI	+ 12.4, 6.7
CS4	+ 5.2
J3	+ 2446, 2432, 2483.2

Procedure Data Type

- 1221 4 no argument list required for parameterless procedures
- CHOL - (Is necessary if proc's are allowed to return functions)
 - IRONMAN o [7A]
 - J73C +
 - J73I + 3.10, 4.10
 - PASCAL + 9.1.2, 8.2
 - PLI + 12.4 (valueless procedures)
 - CS4 - 5.2
 - J3 + 2446.6 (valueless procedures)
- 1222 4 null list required for parameterless procedures
- CHOL + (Is necessary if proc's are allowed to return functions)
 - IRONMAN o [7A]
 - J73C -
 - J73I -
 - PASCAL -
 - PLI + 6.7 (functions)
 - CS4 + 5.2
 - J3 + 2432.1-.2 (functions)
- 1223 4 arguments evaluated in left-to-right order
- CHOL -
 - IRONMAN - 4C, 10E, 7A
 - J73C -
 - J73I -
 - PASCAL -
 - PLI -
 - CS4 + 5.2
 - J3 + 2446.8
- 1224 4 argument evaluation order not specified
- CHOL + (To be consistent with other evaluation ordering decisions)
 - IRONMAN + 4C, 10E, 7A
 - J73C +
 - J73I + 4.8.3
 - PASCAL + 9.1.2, 8.2
 - PLI + 12.4
 - CS4 -
 - J3 -

Procedure Data Type

- 1225 4 call operator for valueless procedures
- CHOL o
 - IRONMAN o [7A]
 - J73C -
 - J73I - 3.10
 - PASCAL - 9.1.2
 - PLI + 12.4
 - CS4 - 5.2
 - J3 - 2446.6 (except close routines invoked by goto, 2483.2)
- 1226 4 object invoked may be yielded by a procedure valued expression
- CHOL +
 - IRONMAN - 5D
 - J73C +
 - J73I - 3.10, 4.10
 - PASCAL - 9.1.2, 8.2
 - PLI + 6.7, 12.4
 - CS4 - 5.2
 - J3 - 2446.6, 2432.1
- 1227 3 relational operations
- CHOL +
 - IRONMAN n 5D
 - J73C +
 - J73I - 4.6, 5.2.2
 - PASCAL - 8.1.4
 - PLI + 7.3.4
 - CS4 -
 - J3 - 2437, 2439
- 1228 4 equality/inequality
- CHOL +
 - IRONMAN n
 - J73C +
 - J73I - 4.6, 5.2.2
 - PASCAL - 8.1.4
 - PLI + 7.3.4.2
 - CS4 -
 - J3 -
- 1229 3 assignment
- CHOL +
 - IRONMAN n 5D
 - J73C +
 - J73I - 3.3
 - PASCAL - 9.1.1
 - PLI + 12.2
 - CS4 - 4.2
 - J3 - 2442

Procedure Data Type

1230	4	exact match required
		CHOL +
		IRONMAN n
		J73C +
		J73I n
		PASCAL n
		PLI - 5.4.17
		CS4 n
		J3 n
1231	4	safe match permitted
		CHOL -
		IRONMAN n
		J73C -
		J73I n
		PASCAL n
		PLI - 5.4.17
		CS4 n
		J3 n
1232	4	constrained by lifetime
		CHOL +
		IRONMAN n
		J73C +
		J73I n
		PASCAL n
		PLI - 12.2
		CS4 n
		J3 n
1233	4	implicit conversion to procedure
		CHOL -
		IRONMAN n
		J73C -
		J73I n
		PASCAL n
		PLI -
		CS4 n
		J3 n
1234	3	expression evaluation...
		CHOL o [2.3]
		IRONMAN . 5D
		J73C o [2.3]
		J73I -
		PASCAL -
		CS4 -
		J3 -

Procedure Data Type

1235	4	implicit conversion to procedure	
		CHOL	-
		IRONMAN	n
		J73C	-
		J73I	-
		PASCAL	-
		PLI	-
		CS4	-
		J3	-
1236	4	evaluation order of operands...	
		CHOL	o [2.3]
		IRONMAN	n
		J73C	o [2.3]
		J73I	-
		PASCAL	-
		CS4	-
		J3	-
1237	5	strictly left-to-right	
		CHOL	-
		IRONMAN	n
		J73C	-
		J73I	n
		PASCAL	n
		PLI	-
		CS4	n
		J3	n
1238	5	left-to-right within equal precedence	
		CHOL	-
		IRONMAN	n
		J73C	-
		J73I	n
		PASCAL	n
		PLI	-
		CS4	n
		J3	n
1239	5	order not specified	
		CHOL	+
		IRONMAN	n
		J73C	+
		J73I	n
		PASCAL	n
		PLI	+ 7.1.4
		CS4	n
		J3	n

Procedure Data Type

1240 3 constant expression evaluation

CHOL	+
IRONMAN	n
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1241 4 invocation

CHOL	-
IRONMAN	n
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1242 4 relational operations

CHOL	+
IRONMAN	n
J73C	+
J73I	n
PASCAL	n
PLI	-
CS4	n
J3	n

1243 3 explicit conversion to procedure

CHOL	-
IRONMAN	n
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1244 3 exception conditions

CHOL	-
IRONMAN	n
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

Procedure Data Type

1245 4 environment not found

CHOL	n *
IRONMAN	n
J73C	n *
J73I	- 2.6.2.2
PASCAL	-
PLI	- 4.1.11, 12.4, 6.7
CS4	-
J3	-

1246 4 lifetime error (assignment)

CHOL	n *
IRONMAN	n
J73C	n *
J73I	-
PASCAL	-
PLI	- 12.2
CS4	-
J3	-

Aggregate Data Types

1247 1 Aggregate Data Types

CHOL	+
IRONMAN	o
J73C	+
J73I	+
PASCAL	+
PLI	+
CS4	+
J3	+

Set Data Type

1248 2 Set Data Type

CHOL	-
IRONMAN	+ 3-4A
J73C	-
J73I	-
PASCAL	+ 6.2.3
PLI	-
CS4	+ B.SET
J3	-

1249 3 component type may be...

CHOL	n *
IRONMAN	o [3-4A]
J73C	n *

1250 4 scalar type (except real)

CHOL	n *
IRONMAN	o [3-4A]
J73C	n *
PASCAL	+ 6.2.3
CS4	+ B.SET

1251 5 integer

CHOL	n *
IRONMAN	- 3-4A
J73C	n *
PASCAL	+ 6.2.3
CS4	-

1252 5 single character

CHOL	n *
IRONMAN	+ 3-4A, 3-2D
J73C	n *
PASCAL	+ 6.2.3
CS4	n

1253 5 boolean

CHOL	n *
IRONMAN	+ 3-4A, 3-2C
J73C	n *
PASCAL	+ 6.2.3
CS4	-

1254 5 status

CHOL	n *
IRONMAN	+ 3-4A
J73C	n *
PASCAL	+ 6.2.3
CS4	+ B.SET

Set Data Type

- 1255 4 subrange of scalar type
 CHOL n *
 IRONMAN o 3-4A
 J73C n *
 PASCAL + 6.2.3
 CS4 -
- 1256 3 set membership specified...
 CHOL n *
 IRONMAN . 3-4A
 J73C n *
- 1257 4 by reference to status type name
 CHOL n *
 IRONMAN o [3-4A]
 J73C n *
 PASCAL + 6.2.3
 CS4 -
- 1258 4 by subrange
 CHOL n *
 IRONMAN o [3-4A]
 J73C n *
 PASCAL + 6.2.3
 CS4 -
- 1259 4 by enumeration
 CHOL n *
 IRONMAN o [3-4A]
 J73C n *
 PASCAL + 6.2.3
 CS4 + B.SET
- 1260 3 maximum set size...
 CHOL n *
 IRONMAN o [3-4A]
 J73C n *
- 1261 4 implementation dependent (word-limited)
 CHOL n *
 IRONMAN - 13F
 J73C n *
 PASCAL + 6.2.3, 14.3
 CS4 + B.SET

Set Data Type

- 1262 5 environmental enquiry
- | | |
|---------|-----------|
| CHOL | n * |
| IRONMAN | n * [13F] |
| J73C | n * |
| PASCAL | - |
| CS4 | - |
- 1263 4 language defined (not word-limited)
- | | |
|---------|-------|
| CHOL | n * |
| IRONMAN | + 13F |
| J73C | n * |
| PASCAL | - |
| CS4 | - |
- 1264 3 constants
- | | |
|---------|----------|
| CHOL | n * |
| IRONMAN | o [3-4A] |
| J73C | n * |
| PASCAL | + |
| CS4 | + |
- 1265 4 the empty set
- | | |
|---------|--------|
| CHOL | n * |
| IRONMAN | - 3-4B |
| J73C | n * |
| PASCAL | + 8 |
| CS4 | - |
- 1266 4 the full set
- | | |
|---------|--------|
| CHOL | n * |
| IRONMAN | - 3-4B |
| J73C | n * |
| PASCAL | + |
| CS4 | - |
- 1267 5 subrange notation
- | | |
|---------|-----|
| CHOL | n * |
| IRONMAN | n |
| J73C | n * |
| PASCAL | + 8 |
| CS4 | - |
- 1268 5 type-dependent notation
- | | |
|---------|-----|
| CHOL | n * |
| IRONMAN | n |
| J73C | n * |
| PASCAL | - |
| CS4 | - |

Set Data Type

1269 4 union of specifically named members
CHOL n *
IRONMAN + 3-4B, 3-3C (constructor operation)
J73C n *
PASCAL + 8
CS4 + B.SET

1270 4 mnemonic names can be specified
CHOL n *
IRONMAN + 5A
J73C n *
PASCAL - 5
CS4 + 2.3

1271 5 run-time values permitted
CHOL n *
IRONMAN + 5A
J73C n *
PASCAL n 5
CS4 + 2.3

1272 3 variables
CHOL n *
IRONMAN + 5B
J73C n *
PASCAL + 7
CS4 + 2.3

1273 4 read-only access specifiable (in a subscope)
CHOL n *
IRONMAN o 3-5B
J73C n *
PASCAL -
CS4 -

1274 4 NULL value specifiable
CHOL n *
IRONMAN o [5B]
J73C n *
PASCAL -
CS4 -

1275 4 undefined value exists
CHOL n *
IRONMAN o [5B]
J73C n *
PASCAL -
CS4 + 2.3.2, B.SET

Set Data Type

- 1276 5 is specifiable
- | | |
|---------|--------|
| CHOL | n * |
| IRONMAN | o [5B] |
| J73C | n * |
| PASCAL | n |
| CS4 | - |
- 1277 3 parameter usage permitted
- | | |
|---------|----------------------|
| CHOL | n * |
| IRONMAN | + 7G |
| J73C | n * |
| PASCAL | + 10, 9.1.2, 11, 8.2 |
| CS4 | + 5.1.1 |
- 1278 4 exact match required
- | | |
|---------|-----------|
| CHOL | n * |
| IRONMAN | o [7G] |
| J73C | n * |
| PASCAL | ? |
| CS4 | + 5.1.1.1 |
- 1279 4 safe match permitted
- | | |
|---------|---------|
| CHOL | n * |
| IRONMAN | o [7G] |
| J73C | n * |
| PASCAL | ? |
| CS4 | - B.SET |
- 1280 3 function value
- | | |
|---------|-------|
| CHOL | n * |
| IRONMAN | + 7D |
| J73C | n * |
| PASCAL | - 11 |
| CS4 | + 5.1 |
- 1281 3 union and intersection operators
- | | |
|---------|-----------------------|
| CHOL | n * |
| IRONMAN | + 3-4B |
| J73C | n * |
| PASCAL | + 6.2.3, 8.1.2, 8.1.3 |
| CS4 | + B.SET |
- 1282 4 parentheses required
- | | |
|---------|----------|
| CHOL | n * |
| IRONMAN | o [3-4B] |
| J73C | n * |
| PASCAL | - 8 |
| CS4 | - B.SET |

Set Data Type

- 1283 3 set difference
- | | |
|---------|----------------|
| CHOL | n * |
| IRONMAN | - 3-4B |
| J73C | n * |
| PASCAL | + 6.2.3, 8.1.3 |
| CS4 | - |
- 1284 3 symmetric difference (xor)
- | | |
|---------|---------|
| CHOL | n * |
| IRONMAN | + 3-4B |
| J73C | n * |
| PASCAL | - 6.2.3 |
| CS4 | + B.SET |
- 1285 3 set complement
- | | |
|---------|---------|
| CHOL | n * |
| IRONMAN | - 3-4B |
| J73C | n * |
| PASCAL | - |
| CS4 | + B.SET |
- 1286 4 parentheses required
- | | |
|---------|---------|
| CHOL | n * |
| IRONMAN | n |
| J73C | n * |
| PASCAL | n |
| CS4 | - B.SET |
- 1287 3 union of expression list elements
- | | |
|---------|--------------------------------|
| CHOL | n * |
| IRONMAN | + 3-4B (constructor operation) |
| J73C | n * |
| PASCAL | + 8 |
| CS4 | + B.SET |
- 1288 3 relational operations...
- | | |
|---------|----------|
| CHOL | n * |
| IRONMAN | o [3-4A] |
| J73C | n * |
| PASCAL | + 8.1.4 |
| CS4 | + B.SET |
- 1289 4 equality/inequality
- | | |
|---------|---------|
| CHOL | n * |
| IRONMAN | + 3-4B |
| J73C | n * |
| PASCAL | + 8.1.4 |
| CS4 | + B.SET |

Set Data Type

1290 4 subset comparisons (inclusion)

CHOL	n *
IRONMAN	- 3-4B
J73C	n *
PASCAL	+ 8.1.4
CS4	+ B.SET

1291 4 set membership

CHOL	n *
IRONMAN	+ 3-4B
J73C	n *
PASCAL	+ 8.1.4
CS4	+ B.SET

1292 3 assignment

CHOL	n *
IRONMAN	+ 5F
J73C	n *
PASCAL	+ 9.1.1
CS4	+ 4.2, B.SET

1293 4 implicit conversion

CHOL	n *
IRONMAN	- 3B
J73C	n *
PASCAL	- 9.1.1
CS4	- B.SET

1294 5 from integer

CHOL	n *
IRONMAN	n
J73C	n *
PASCAL	-
CS4	-

1295 5 from bit

CHOL	n *
IRONMAN	n
J73C	n *
PASCAL	n
CS4	n

1296 3 expression evaluation...

CHOL	n *
IRONMAN	o [3-4A]
J73C	n *

Set Data Type

- 1297 4 implicit conversion of operands
- | | |
|---------|---------|
| CHOL | n * |
| IRONMAN | - 3B |
| J73C | n * |
| PASCAL | - 8 |
| CS4 | - B.SET |
- 1298 5 as for assignment
- | | |
|---------|----------------------------|
| CHOL | n * |
| IRONMAN | + 3B (i.e., no conversion) |
| J73C | n * |
| PASCAL | + (i.e., none) |
| CS4 | + (i.e., none) |
- 1299 4 evaluation order of operands...
- | | |
|---------|----------|
| CHOL | n * |
| IRONMAN | o [3-4A] |
| J73C | n * |
- 1300 5 strictly left-to-right
- | | |
|---------|----------|
| CHOL | n * |
| IRONMAN | - 4C, 1D |
| J73C | n * |
| PASCAL | - |
| CS4 | + 3.0 |
- 1301 5 left-to-right within equal precedence
- | | |
|---------|----------|
| CHOL | n * |
| IRONMAN | - 4C, 1D |
| J73C | n * |
| PASCAL | - |
| CS4 | - |
- 1302 5 order not specified
- | | |
|---------|---------------|
| CHOL | n * |
| IRONMAN | + 4C, 1D, 10E |
| J73C | n * |
| PASCAL | + 8 |
| CS4 | - |
- 1303 3 constant expression evaluation
- | | |
|---------|-------|
| CHOL | n * |
| IRONMAN | + 4E |
| J73C | n * |
| PASCAL | - |
| CS4 | - 7.1 |

Set Data Type

1304	4	union and intersection	CHOL	n *
			IRONMAN	+ 3-4B, 4E
			J73C	n *
			PASCAL	-
			CS4	- 7.1
1305	4	complement and/or difference	CHOL	n *
			IRONMAN	- 3-4B, 4E
			J73C	n *
			PASCAL	-
			CS4	- 7.1
1306	4	equality relation	CHOL	n *
			IRONMAN	+ 3-4B, 4E
			J73C	n *
			PASCAL	-
			CS4	- 7.1
1307	4	inclusion relation	CHOL	n *
			IRONMAN	- 3-4B, 4E
			J73C	n *
			PASCAL	-
			CS4	-
1308	4	membership relation	CHOL	n *
			IRONMAN	+ 3-4B, 4E
			J73C	n *
			PASCAL	-
			CS4	-
1309	4	evaluation not limited by host machine word size	CHOL	n *
			IRONMAN	+ 13F, 4E
			J73C	n *
			PASCAL	n
			CS4	?
1310	3	explicit conversion	CHOL	n *
			IRONMAN	o [3-4A]
			J73C	n *
			PASCAL	-
			CS4	-

Set Data Type

1311 4 from integer
 CHOL n *
 IRONMAN ? 3-5D, 3B, 3C, 4B
 J73C n *
 PASCAL -
 CS4 -

1312 4 from bit
 CHOL n *
 IRONMAN n
 J73C n *
 PASCAL n
 CS4 n

1313 3 exception conditions
 CHOL n *
 IRONMAN o [3-4A]
 J73C n *
 PASCAL -
 CS4 +

1314 4 conversion error
 CHOL n *
 IRONMAN n
 J73C n *
 PASCAL -
 CS4 + B.SET

File Data Type

1315 2 File Data Type

CHOL	-	(Will be done by extensions)
IRONMAN	+	8B, 3-3A
J73C	-	(will be done by extensions)
J73I	-	
PASCAL	+	
PLI	+	
CS4	+	
J3	+	

1316 3 association with particular device

CHOL	n *	[(Will be done by extensions)]
IRONMAN	o	[8B, 3-3A]
J73C	n *	[(will be done by extensions)]

1317 3 access restrictions

CHOL	n *	[(Will be done by extensions)]
IRONMAN	o	[8B, 3-3A]
J73C	n *	[(will be done by extensions)]

1318 4 read-only

CHOL	n *	[(Will be done by extensions)]
IRONMAN	o	[8B, 3-3A]
J73C	n *	[(will be done by extensions)]

1319 4 write-only

CHOL	n *	[(Will be done by extensions)]
IRONMAN	o	[8B, 3-3A]
J73C	n *	[(will be done by extensions)]

1320 4 update

CHOL	n *	[(Will be done by extensions)]
IRONMAN	o	[8B, 3-3A]
J73C	n *	[(will be done by extensions)]

1321 3 representation...

CHOL	n *	[(Will be done by extensions)]
IRONMAN	o	[8B, 3-3A]
J73C	n *	[(will be done by extensions)]

1322 4 lexeme stream

CHOL	n *	[(Will be done by extensions)]
IRONMAN	o	[8B, 3-3A]
J73C	n *	[(will be done by extensions)]

1323 5 character-oriented

CHOL	n *	[(Will be done by extensions)]
IRONMAN	o	[8B, 3-3A]
J73C	n *	[(will be done by extensions)]

File Data Type

1324	5	line-oriented	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1325	4	binary stream	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1326	4	binary record	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1327	5	sequential	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1328	5	indexed	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1329	5	direct	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1330	3	blocking characteristics	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1331	4	fixed length	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1332	4	variable length	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1333	4	records span blocks	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]

File Data Type

- 1334 4 blocking factor specifiable
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B, 3-3A]
J73C n * [(will be done by extensions)]
- 1335 3 shared files (see also II.11.17)
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B, 3-3A]
J73C n * [(will be done by extensions)]
- 1336 3 read operation
CHOL n * [(Will be done by extensions)]
IRONMAN + 8B
J73C n * [(will be done by extensions)]
- 1337 4 length of record read available
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]
- 1338 4 end-of-line exception
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]
- 1339 4 end-of-file exception
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]
- 1340 4 no-such-file exception
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]
- 1341 4 access-error exception
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]
- 1342 4 physical-error exception
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]
- 1343 4 end-of-volume exception
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]

File Data Type

1344 3 write operation
CHOL n * [(Will be done by extensions)]
IRONMAN + 8B
J73C n * [(will be done by extensions)]

1345 4 access-error exception
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]

1346 4 physical-error exception
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]

1347 4 end-of-volume exception
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]

1348 4 end-of-page exception
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]

1349 4 line overflow
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]

1350 3 open operation
CHOL n * [(Will be done by extensions)]
IRONMAN + 8B
J73C n * [(will be done by extensions)]

1351 3 close operation
CHOL n * [(Will be done by extensions)]
IRONMAN + 8B
J73C n * [(will be done by extensions)]

1352 4 implicit
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]

1353 4 explicit
CHOL n * [(Will be done by extensions)]
IRONMAN o [8B]
J73C n * [(will be done by extensions)]

File Data Type

```

1354 3  variable length argument list
        CHOL      n * [(Will be done by extensions)]
        IRONMAN   o [8B, 3-3A]
        J73C      n * [(will be done by extensions)]

1355 3  edit controls...
        CHOL      n * [(Will be done by extensions)]
        IRONMAN   o [8B, 3-3A]
        J73C      n * [(will be done by extensions)]

1356 4  numeric
        CHOL      n * [(Will be done by extensions)]
        IRONMAN   o [8B, 3-3A]
        J73C      n * [(will be done by extensions)]

1357 4  character
        CHOL      n * [(Will be done by extensions)]
        IRONMAN   o [8B, 3-3A]
        J73C      n * [(will be done by extensions)]

1358 4  available for input and output
        CHOL      n * [(Will be done by extensions)]
        IRONMAN   o [8B, 3-3A]
        J73C      n * [(will be done by extensions)]

1359 4  conversion exception
        CHOL      n * [(Will be done by extensions)]
        IRONMAN   o [8B, 3-3A]
        J73C      n * [(will be done by extensions)]

1360 3  line printer operations...
        CHOL      n * [(Will be done by extensions)]
        IRONMAN   o [8B, 3-3A]
        J73C      n * [(will be done by extensions)]

1361 4  no skip
        CHOL      n * [(Will be done by extensions)]
        IRONMAN   o [8B, 3-3A]
        J73C      n * [(will be done by extensions)]

1362 4  skip (n)
        CHOL      n * [(Will be done by extensions)]
        IRONMAN   o [8B, 3-3A]
        J73C      n * [(will be done by extensions)]

1363 4  page
        CHOL      n * [(Will be done by extensions)]
        IRONMAN   o [8B, 3-3A]
        J73C      n * [(will be done by extensions)]

```

File Data Type

1364	4	line size specifiable	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1365	4	page size specifiable	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1366	3	sequential file operations...	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1367	4	rewind	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	+ 8B
		J73C	n * [(will be done by extensions)]
1368	4	backup	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	+ 8B
		J73C	n * [(will be done by extensions)]
1369	4	skip	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	+ 8B
		J73C	n * [(will be done by extensions)]
1370	3	indexed and direct file operations	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1371	4	position	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	+ 8B
		J73C	n * [(will be done by extensions)]
1372	4	rewrite	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]
1373	4	insert	
		CHOL	n * [(Will be done by extensions)]
		IRONMAN	o [8B, 3-3A]
		J73C	n * [(will be done by extensions)]

File Data Type

```

1374 4    delete
          CHOL      n * [(Will be done by extensions)]
          IRONMAN   o [8B, 3-3A]
          J73C      n * [(will be done by extensions)]

1375 3    block transmitting operations...
          CHOL      n * [(Will be done by extensions)]
          IRONMAN   o [8B, 3-3A]
          J73C      n * [(will be done by extensions)]

1376 4    read-block
          CHOL      n * [(Will be done by extensions)]
          IRONMAN   o [8B, 3-3A]
          J73C      n * [(will be done by extensions)]

1377 4    write-block
          CHOL      n * [(Will be done by extensions)]
          IRONMAN   o [8B, 3-3A]
          J73C      n * [(will be done by extensions)]

1378 4    end-of-block exception
          CHOL      n * [(Will be done by extensions)]
          IRONMAN   o [8B, 3-3A]
          J73C      n * [(will be done by extensions)]

1379 3    process control permitted for i/o operations
          CHOL      n * [(Will be done by extensions)]
          IRONMAN   o [8B, 3-3A]
          J73C      n * [(will be done by extensions)]

1380 3    shared file operations...
          CHOL      n * [(Will be done by extensions)]
          IRONMAN   o [8B, 3-3A]
          J73C      n * [(will be done by extensions)]

1381 4    lock for reading
          CHOL      n * [(Will be done by extensions)]
          IRONMAN   o [8B, 3-3A]
          J73C      n * [(will be done by extensions)]

1382 4    lock for writing
          CHOL      n * [(Will be done by extensions)]
          IRONMAN   o [8B, 3-3A]
          J73C      n * [(will be done by extensions)]

1383 4    unlock
          CHOL      n * [(Will be done by extensions)]
          IRONMAN   o [8B, 3-3A]
          J73C      n * [(will be done by extensions)]

```

File Data Type

1384 3 shorthand notation for reading/writing aggregates

CHOL n * [(Will be done by extensions)]

IRONMAN o [8B, 3-3A]

J73C n * [(will be done by extensions)]

1385 3 correct data types, special operations for binary stream files

CHOL n * [(Will be done by extensions)]

IRONMAN o [8B, 3-3A]

J73C n * [(will be done by extensions)]

Array Data Type

1386 2 Array Data Type

CHOL + 1.2.1
IRONMAN + 3-3A, 3-3D
J73C + 1.2.1 (tables)
J73I + (tables)
PASCAL + 6.2.1, 7.2.1
PLI +
CS4 + 3.4
J3 +

1387 3 type of array elements may be...

CHOL o [1.2.1]
IRONMAN o [3-3A, 3-3D]
J73C o [1.2.1 (tables)]

1388 4 any scalar type

CHOL +
IRONMAN + 3-3B
J73C +
J73I + 2.1.5.6, 2.1.5.7
PASCAL + 6.2.1
PLI + 4.2.1
CS4 + 3.4.1
J3 + 2468.1, 2468.3

1389 4 array type

CHOL +
IRONMAN + 3-3B
J73C +
J73I -
PASCAL + 6.2.1
PLI - 4.2, 5.4.15
CS4 + 3.4.1
J3 - 2468.1, 2468.3

1390 4 structure type

CHOL +
IRONMAN + 3-3B
J73C +
J73I + 2.1.5.6, 2.1.5.7 (tables)
PASCAL + 6.2.1
PLI + 4.2.3
CS4 + 3.4.1
J3 - 2468.1, 2468.3 (for tables, see structure data type)

Array Data Type

1391	4	label type	
		CHOL	-
		IRONMAN	- 5D
		J73C	-
		J73I	-
		PASCAL	-
		PLI	+ 4.2.1
		CS4	-
		J3	- 2468.1, 2468.3
1392	4	procedure type	
		CHOL	+
		IRONMAN	- 5D
		J73C	+
		J73I	-
		PASCAL	-
		PLI	+ 4.2.1
		CS4	-
		J3	- 2468.1, 2468.3
1393	4	union type	
		CHOL	+
		IRONMAN	+ 3-3B, 3-3H
		J73C	+
		J73I	-
		PASCAL	+ (variant records)
		PLI	-
		CS4	+ 3.4.1
		J3	-
1394	4	other types	
		CHOL	+ (Character string, bit string)
		IRONMAN	+ 3-3B
		J73C	+ (character string, bit string)
		J73I	-
		PASCAL	+ 6.2.1 (set, file)
		PLI	+ 4.2.1 (file, area, format)
		CS4	+ 3.4.1 (set, matrix, vector)
		J3	+ 2468.1, 2468.3 (dual, character string)
1395	4	any specifiable type (of variables)	
		CHOL	+
		IRONMAN	+ 3-3B
		J73C	+
		J73I	-
		PASCAL	+ 6.2.1
		PLI	-
		CS4	+ 3.4.1
		J3	- 2468.1, 2468.3

Array Data Type

1396 3 other domain sets than integers

CHOL	+
IRONMAN	+ 3-3D
J73C	+
J73I	- 2.1.5.3
PASCAL	+ 6.2.1
PLI	- 5.4.15
CS4	+ 3.4.1
J3	- 2424

1397 4 single character

CHOL	+ (char(1))
IRONMAN	+ 3-3D, 3-2D
J73C	+ (char(1))
J73I	n
PASCAL	+ 6.2.1
PLI	n
CS4	n
J3	n

1398 4 boolean

CHOL	+
IRONMAN	+ 3-3D, 3-2C
J73C	+
J73I	n
PASCAL	+ 6.2.1
PLI	n
CS4	-
J3	-

1399 4 status

CHOL	+
IRONMAN	+ 3-3D
J73C	+
J73I	-
PASCAL	+ 6.2.1
PLI	n
CS4	+ 3.4.1
J3	-

1400 3 number of dimensions...

CHOL	o [1.2.1]
IRONMAN	o [3-3A, 3-3D]
J73C	o [1.2.1 (tables)]

Array Data Type

1401 4 at most one
 CHOL -
 IRONMAN - 13F
 J73C -
 J73I -
 PASCAL -
 PLI -
 CS4 -
 J3 -

1402 4 at most two
 CHOL -
 IRONMAN - 13F
 J73C -
 J73I -
 PASCAL -
 PLI -
 CS4 -
 J3 -

1403 4 at most three
 CHOL o
 IRONMAN - 13F
 J73C -
 J73I -
 PASCAL -
 PLI -
 CS4 -
 J3 -

1404 4 more than three
 CHOL o
 IRONMAN + 13F
 J73C +
 J73I + 2.1.5.3.2
 PASCAL + 6.2.1
 PLI + 5.4.15
 CS4 + 3.4.1
 J3 + 2468.1-.2

1405 3 variability of array bounds...
 CHOL o [1.2.1]
 IRONMAN o [3-3A, 3-3D]
 J73C o [1.2.1 (tables)]

1406 4 fixed at compile time for...
 CHOL o [1.2.1]
 IRONMAN o [3-3A, 3-3D]
 J73C o [1.2.1 (tables)]

Array Data Type

1407 5	static storage
	CHOL +
	IRONMAN ? 3-3D
	J73C +
	J73I + 2.1.5.3.1
	PASCAL + 6.2.1
	PLI + 4.3.2.3
	CS4 + 3.4.1
	J3 + 2468.1
1408 5	non-static storage
	CHOL -
	IRONMAN + 3-3D
	J73C -
	J73I + 2.1.5.3.1
	PASCAL + 6.2.1
	PLI -
	CS4 -
	J3 n
1409 4	fixed at time of allocation for...
	CHOL o [1.2.1]
	IRONMAN o [3-3A, 3-3D]
	J73C o [1.2.1 (tables)]
1410 5	static storage
	CHOL -
	IRONMAN + 3-3D
	J73C -
	J73I -
	PASCAL -
	PLI -
	CS4 -
	J3 -
1411 5	non-static storage
	CHOL +
	IRONMAN + 3-3D
	J73C +
	J73I -
	PASCAL -
	PLI + 4.3.2.2, 4.3.2.4
	CS4 + 3.4.1
	J3 -

Array Data Type

1412 4 current bounds determined by assignment...

CHOL	-
IRONMAN	- 3-3D
J73C	-
J73I	-
PASCAL	-
PLI	+ 4.3.2.5 (based storage)
CS4	-
J3	-

1413 5 of individual elements

CHOL	n *
IRONMAN	n
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1414 5 of whole array

CHOL	n *
IRONMAN	n
J73C	n *
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1415 5 to explicit bounds variables

CHOL	n *
IRONMAN	n
J73C	n *
J73I	-
PASCAL	-
PLI	+ 4.3.2.5, 5.4.15
CS4	-
J3	-

1416 4 initial allocation bounds specified in... (heap arrays)

CHOL	o [1.2.1]
IRONMAN	o [3-3A, 3-3D]
J73C	o [1.2.1 (tables)]
J73I	n
CS4	n
J3	n

Array Data Type

1417 5 declaration
 CHOL +
 IRONMAN ? 3-3I, 3-3D
 J73C +
 J73I n
 PASCAL + 6.2.1
 PLI + 12.1, 4.3.2.1, 4.3.2.4, 4.3.2.5
 CS4 n
 J3 n

1418 5 allocation operation
 CHOL -
 IRONMAN ? 3-3I, 3-3D, 12D
 J73C -
 J73I n
 PASCAL -
 PLI - 12.1
 CS4 n
 J3 n

1419 5 previous generation
 CHOL -
 IRONMAN - 3-3I, 1A
 J73C -
 J73I n
 PASCAL -
 PLI - 12.1
 CS4 n
 J3 n

1420 3 lower bounds...
 CHOL o [1.2.1]
 IRONMAN o [3-3A, 3-3D]
 J73C o [1.2.1 (tables)]

1421 4 built-in
 CHOL o
 IRONMAN o 1C, 3-3D
 J73C -
 J73I -
 PASCAL -
 PLI -
 CS4 -
 J3 + 2468.1

Array Data Type

1422 4 programmer may specify

CHOL	o
IRONMAN	+ 3-3D, 1C
J73C	+
J73I	+ 2.1.5.3
PASCAL	-
PLI	+ 5.4.15
CS4	-
J3	-

1423 4 programmer must specify

CHOL	o
IRONMAN	o 3-3D, 1C
J73C	-
J73I	-
PASCAL	+ 6.2.1
PLI	-
CS4	+ 3.4.1
J3	-

1424 4 default is zero

CHOL	o
IRONMAN	o 3-3D
J73C	+
J73I	+ 2.1.5.3.2
PASCAL	-
PLI	-
CS4	-
J3	+ 2468.6

1425 4 default is one

CHOL	o
IRONMAN	o 3-3D
J73C	-
J73I	-
PASCAL	-
PLI	+ 5.4.15
CS4	-
J3	-

Array Data Type

- 1426 4 uniform default lower bounds for index sets
- | | |
|---------|---|
| CHOL | + |
| IRONMAN | o [3-3A, 3-3D] |
| J73C | + |
| J73I | + 2.1.5.3.2, 2.4.2 |
| PASCAL | ? (default representation of status values not defined) |
| PLI | + 5.4.15, 13.1.16 |
| CS4 | + 3.6.3.1, 3.6.4.1, 3.2.1.3.4.2, 3.3.3.4.2 (string, status) |
| J3 | + 2424.3, 2426.6, 2428 |
-
- 1427 3 packing attributes
- | | |
|---------|--------------------|
| CHOL | o [1.2.1] |
| IRONMAN | o [3-3A, 3-3D] |
| J73C | o [1.2.1 (tables)] |
-
- 1428 4 machine-independent packing
- | | |
|---------|-----------------|
| CHOL | + |
| IRONMAN | + 11B, 12C, 11F |
| J73C | + |
| J73I | + |
| PASCAL | + 6.2 |
| PLI | + 4.3.1 |
| CS4 | - |
| J3 | + |
-
- 1429 5 tight packing
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | o [11B, 12C, 11F] |
| J73C | + |
| J73I | - |
| PASCAL | ? |
| PLI | - |
| CS4 | - |
| J3 | - |
-
- 1430 5 dense packing
- | | |
|---------|-------------------|
| CHOL | + |
| IRONMAN | o [11B, 12C, 11F] |
| J73C | + |
| J73I | + 2.1.5.5 |
| PASCAL | ? |
| PLI | + 5.4.52, 4.3.1.3 |
| CS4 | - |
| J3 | - |

Array Data Type

1431	5	medium packing	
		CHOL	+
		IRONMAN	o [11B, 12C, 11F]
		J73C	+
		J73I	+ 2.1.5.5
		PASCAL	?
		PLI	-
		CS4	-
		J3	+ 2469.1
1432	5	unpacked	
		CHOL	+
		IRONMAN	o [11B, 12C, 11F]
		J73C	+
		J73I	+ 2.1.5.5
		PASCAL	+ 6.2
		PLI	+ 5.4.1, 4.3.1.3
		CS4	+ 3.4.1
		J3	- 2469.1
1433	5	degree of packing is implementation defined	
		CHOL	-
		IRONMAN	o [11B, 12C, 11F]
		J73C	-
		J73I	-
		PASCAL	+ 6.2
		PLI	+ 4.3.1
		CS4	+
		J3	- 2469.1
1434	5	degree of packing is type dependent	
		CHOL	-
		IRONMAN	o [11B, 12C, 11F]
		J73C	-
		J73I	-
		PASCAL	?
		PLI	+ 4.3.1
		CS4	?
		J3	+ 2469.1 (everything unpacked except boolean)
1435	4	machine-dependent packing	
		CHOL	+
		IRONMAN	+ 11A, 12C
		J73C	+
		J73I	-
		PASCAL	-
		PLI	-
		CS4	-
		J3	-

Array Data Type

1436 5 separated from logical structure
 CHOL o (tend to ~ for maintainability)
 IRONMAN + 11A, 12C
 J73C o (tend to ~ for maintainability)
 J73I n
 PASCAL n
 PLI n
 CS4 n
 J3 n

1437 4 programmer-definable access and update
 CHOL +
 IRONMAN + 3-3A, 7A
 J73C -
 J73I -
 PASCAL -
 PLI + 4.3.3.4
 CS4 -
 J3 -

1438 5 limited to PL/I correspondence defining
 CHOL -
 IRONMAN - 3-3A, 7A
 J73C n
 J73I n
 PASCAL n
 PLI + 4.3.3.4
 CS4 n
 J3 n

1439 3 constants
 CHOL +
 IRONMAN o [3-3A, 3-3D]
 J73C +
 J73I -
 PASCAL -
 PLI -
 CS4 +
 J3 -

1440 4 array literals (list of element expressions)
 CHOL +
 IRONMAN + 3-3C, 5E, 2H
 J73C +
 J73I -
 PASCAL -
 PLI -
 CS4 + 3.4.3.4.1
 J3 -

Array Data Type

1441 4 mnemonic names can be specified

CHOL	+
IRONMAN	+ 5A
J73C	+
J73I	-
PASCAL	- 5
PLI	-
CS4	+ 2.3
J3	-

1442 5 run-time values permitted

CHOL	+
IRONMAN	+ 5A
J73C	+
J73I	n
PASCAL	n 5
PLI	n
CS4	+ 2.3
J3	n

1443 3 variables

CHOL	+
IRONMAN	+ 5B
J73C	+
J73I	+ 4.11, 2.1.5
PASCAL	+ 7
PLI	+ 4.1.3, 5.4.54, 6, 5.5
CS4	+ 2.3
J3	+ 2422, 2424, 2468

1444 4 read-only access specifiable (in a subscope)

CHOL	+
IRONMAN	o 3-5B
J73C	+
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

1445 4 NULL value specifiable

CHOL	-
IRONMAN	o [5B]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	-
J3	-

Array Data Type

1446 4 undefined value exists

CHOL	-
IRONMAN	o [5B]
J73C	-
J73I	-
PASCAL	-
PLI	-
CS4	+ 2.3.2, 3.4.3.4
J3	-

1447 5 is specifiable

CHOL	n
IRONMAN	o [5B]
J73C	n
J73I	n
PASCAL	n
PLI	n
CS4	-
J3	n

1448 3 initialization

CHOL	+
IRONMAN	+ 5E
J73C	+
J73I	+ 2.1.5.6, 2.1.5.7, 2.1.7
PASCAL	-
PLI	+ 5.4.25
CS4	+ 3.4.3.4
J3	+ 2467-8

1449 4 scalar and array variables have same default initialization

CHOL	+ (i.e., no defaulting)
IRONMAN	+ 5E (i.e., no default initialization)
J73C	+
J73I	+ (i.e., none)
PASCAL	+ (i.e., none)
PLI	+ (i.e., none)
CS4	+ 2.3.2
J3	+ (i.e., none)

1450 4 list of element values may be specified

CHOL	+
IRONMAN	o 3-3C, 5E
J73C	+
J73I	+ 2.1.7
PASCAL	-
PLI	+ 5.4.25
CS4	+ 3.4.3.4
J3	+ 2467-8

Array Data Type

1451 5 number of specified elements must match number of array elements

CHOL	o
IRONMAN	o [3-3C, 5E]
J73C	-
J73I	- 2.1.7
PASCAL	n
PLI	+ 5.4.25
CS4	+ 3.4.3.4
J3	- 2468.4

1452 5 skips permitted

CHOL	o
IRONMAN	o [3-3C, 5E]
J73C	+
J73I	+ 2.1.7
PASCAL	n
PLI	+ 5.4.25
CS4	-
J3	- 2467, 2468.5

1453 5 element index may be specified

CHOL	o
IRONMAN	o [3-3C, 5E]
J73C	+
J73I	+ 2.1.7
PASCAL	n
PLI	-
CS4	-
J3	- 2467

1454 5 replication factors permitted

CHOL	o
IRONMAN	o 5E, 3-3C, 2H, 1E
J73C	+
J73I	+ 2.1.7
PASCAL	n
PLI	+ 5.4.25
CS4	-
J3	- 2467

1455 5 nested lists permitted

CHOL	o
IRONMAN	o [3-3C, 5E]
J73C	+
J73I	+ 2.1.7
PASCAL	n
PLI	+ 5.4.25
CS4	-
J3	+ 2467, 2468.4-.8

Array Data Type

- ```

1456 4 single element value specified, used for each array element
 CHOL +
 IRONMAN + 5E, 3-3D (needed for arrays whose bounds are not known
 until run time)
 J73C +
 J73I - 2.1.7
 PASCAL -
 PLI - 5.4.25
 CS4 + 3.4.3.4
 J3 - 2468.1

1457 4 array valued expression specified, used directly
 CHOL + (If array assignment is permitted)
 IRONMAN o 5E, 3-3C
 J73C + (if array assignment is permitted)
 J73I - 2.1.7
 PASCAL -
 PLI - 5.4.25
 CS4 + 3.4.3.4
 J3 - 2468.1

1458 3 parameter usage permitted
 CHOL +
 IRONMAN + 7G, 7H
 J73C +
 J73I + 2.2
 PASCAL + 10, 9.1.2, 11, 8.2
 PLI + 6.10
 CS4 + 5.1.1
 J3 + 2446, 2484

1459 4 actual and formal bounds must match
 CHOL +
 IRONMAN + 7G, 3-3E, 1E, 7H
 J73C +
 J73I + 2.2.3.2 (but not enforced)
 PASCAL ?
 PLI - 6.10.1, 6.10.2
 CS4 + 5.1.1.1 (REF, NAME parameters)
 J3 + 2446.7

```

## Array Data Type

1460 4 bounds or extents match as in assignment

|         |                             |
|---------|-----------------------------|
| CHOL    | +                           |
| IRONMAN | + 3-3E, 7G, 1E              |
| J73C    | +                           |
| J73I    | n                           |
| PASCAL  | ?                           |
| PLI     | + 9.3, 4.2, 6.10, 12.2      |
| CS4     | + 5.1.1.1 (COPY parameters) |
| J3      | n                           |

1461 4 actual bounds used for formal bounds

|         |                    |
|---------|--------------------|
| CHOL    | +                  |
| IRONMAN | + 7H, 3-3E, 1E, 7G |
| J73C    | +                  |
| J73I    | -                  |
| PASCAL  | - 10, 9.1.2        |
| PLI     | + 6.10.3           |
| CS4     | + 3.4.1            |
| J3      | -                  |

1462 4 relationships among parameter bounds are specifiable

|         |             |
|---------|-------------|
| CHOL    | -           |
| IRONMAN | o 7H, 12D   |
| J73C    | -           |
| J73I    | -           |
| PASCAL  | - 10, 9.1.2 |
| PLI     | -           |
| CS4     | -           |
| J3      | -           |

1463 4 representation conversions permitted

|         |                                      |
|---------|--------------------------------------|
| CHOL    | -                                    |
| IRONMAN | - 3B (floating point precision only) |
| J73C    | -                                    |
| J73I    | - 2.2.3.2                            |
| PASCAL  | ?                                    |
| PLI     | + 6.10.1, 6.10.2                     |
| CS4     | -                                    |
| J3      | - 2446.7                             |

1464 5 only safe conversions permitted

|         |                                          |
|---------|------------------------------------------|
| CHOL    | n *                                      |
| IRONMAN | n * [3B (floating point precision only)] |
| J73C    | n *                                      |
| J73I    | n                                        |
| PASCAL  | ?                                        |
| PLI     | -                                        |
| CS4     | -                                        |
| J3      | n                                        |

## Array Data Type

### 1465 5    packing conversions permitted

|         |                  |
|---------|------------------|
| CHOL    | n *              |
| IRONMAN | ? 11B            |
| J73C    | n *              |
| J73I    | n                |
| PASCAL  | ?                |
| PLI     | + 6.10.1, 6.10.2 |
| CS4     | n                |
| J3      | n                |

### 1466 5    same conversions as in assignment statements

|         |                                                                            |
|---------|----------------------------------------------------------------------------|
| CHOL    | + (i.e., none)                                                             |
| IRONMAN | + 3B (i.e., none, except for floating pt. accuracy and<br>fixed pt. range) |
| J73C    | + (i.e., none)                                                             |
| J73I    | n                                                                          |
| PASCAL  | ?                                                                          |
| PLI     | + 6.10.2, 12.2                                                             |
| CS4     | + 5.1.1.1 (COPY parameters)                                                |
| J3      | n                                                                          |

### 1467 4    range information used as for scalar parameters

|         |                    |
|---------|--------------------|
| CHOL    | +                  |
| IRONMAN | + 1E, 7G           |
| J73C    | +                  |
| J73I    | + (i.e., not used) |
| PASCAL  | ?                  |
| PLI     | + (i.e., not used) |
| CS4     | +                  |
| J3      | + (i.e., not used) |

### 1468 4    pass subarray as actual parameter

|         |                                      |
|---------|--------------------------------------|
| CHOL    | -                                    |
| IRONMAN | + 3-3E (one-dimensional arrays only) |
| J73C    | -                                    |
| J73I    | n                                    |
| PASCAL  | n 10, 9.1.2, 7.2.1                   |
| PLI     | + 6.10.1, 6.10.2, 6.10.3             |
| CS4     | + 3.4.3.1, 5.1.1                     |
| J3      | n                                    |

## Array Data Type

- 1469 4    pass scalar to an array parameter
- |         |                       |
|---------|-----------------------|
| CHOL    | -                     |
| IRONMAN | o [7G, 7H]            |
| J73C    | -                     |
| J73I    | - 2.2.3.2             |
| PASCAL  | - 10, 9.1.2           |
| PLI     | + 9.3, 6.10.2, 6.10.1 |
| CS4     | -                     |
| J3      | - 2446.7              |
- 1470 5    yields single element array
- |         |      |
|---------|------|
| CHOL    | n *  |
| IRONMAN | o 5E |
| J73C    | n    |
| J73I    | n    |
| PASCAL  | n    |
| PLI     | -    |
| CS4     | n    |
| J3      | n    |
- 1471 5    yields multiple element array with same element values
- |         |                                                 |
|---------|-------------------------------------------------|
| CHOL    | n *                                             |
| IRONMAN | o 5E (should be consistent with initialization) |
| J73C    | n                                               |
| J73I    | n                                               |
| PASCAL  | n                                               |
| PLI     | + 9.3                                           |
| CS4     | n                                               |
| J3      | n                                               |
- 1472 3    returnable as function values
- |         |                      |
|---------|----------------------|
| CHOL    | -                    |
| IRONMAN | + 7D, 12D            |
| J73C    | -                    |
| J73I    | - 2.2.2              |
| PASCAL  | - 11                 |
| PLI     | + 12.21, 5.4.47, 6.7 |
| CS4     | + 5.1                |
| J3      | - 2485.3             |
- 1473 4    efficiently returnable
- |         |          |
|---------|----------|
| CHOL    | n        |
| IRONMAN | + 7D, 1D |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | ?        |
| CS4     | ?        |
| J3      | n        |



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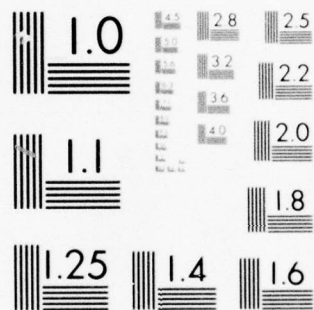
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4 OF 5

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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

## Array Data Type

### 1474 3 indexing

|         |                |
|---------|----------------|
| CHOL    | +              |
| IRONMAN | o [3-3A, 3-3D] |
| J73C    | +              |
| J73I    | + 4.11         |
| PASCAL  | + 7.2.1        |
| PLI     | + 6.2, 6.3     |
| CS4     | + 3.4.3.1      |
| J3      | + 2424         |

### 1475 4 implicit conversion from real is permitted

|         |               |
|---------|---------------|
| CHOL    | -             |
| IRONMAN | - 3B          |
| J73C    | -             |
| J73I    | - 4.11, 1.7.1 |
| PASCAL  | - 7.2.1       |
| PLI     | + 6.2         |
| CS4     | - 3.4.3.1     |
| J3      | +             |

### 1476 5 by truncation

|         |                   |
|---------|-------------------|
| CHOL    | n *               |
| IRONMAN | n                 |
| J73C    | n                 |
| J73I    | n                 |
| PASCAL  | n                 |
| PLI     | + 8.2.10, 7.3.1.2 |
| CS4     | n                 |
| J3      | + 2424.3          |

### 1477 5 by rounding

|         |     |
|---------|-----|
| CHOL    | n * |
| IRONMAN | n   |
| J73C    | n   |
| J73I    | n   |
| PASCAL  | n   |
| PLI     | -   |
| CS4     | n   |
| J3      | -   |

### 1478 5 rounding or truncation is implementation dependent

|         |     |
|---------|-----|
| CHOL    | n * |
| IRONMAN | n   |
| J73C    | n   |
| J73I    | n   |
| PASCAL  | n   |
| PLI     | -   |
| CS4     | n   |
| J3      | -   |

## Array Data Type

### 1479 5      rounding/truncation determinable by env. query

|         |     |
|---------|-----|
| CHOL    | n * |
| IRONMAN | n   |
| J73C    | n   |
| J73I    | n   |
| PASCAL  | n   |
| PLI     | -   |
| CS4     | n   |
| J3      | -   |

### 1480 5      depends on rounding attribute of source variable

|         |     |
|---------|-----|
| CHOL    | n * |
| IRONMAN | n   |
| J73C    | n   |
| J73I    | n   |
| PASCAL  | n   |
| PLI     | -   |
| CS4     | n   |
| J3      | -   |

### 1481 4      implicit conversion from status type

|         |                                                     |
|---------|-----------------------------------------------------|
| CHOL    | -                                                   |
| IRONMAN | - 3B (status values serve directly as index values) |
| J73C    | + (unless RESTRICTED)                               |
| J73I    | + 2.4.2 (status constants are integer type)         |
| PASCAL  | - 7.2.1                                             |
| PLI     | n                                                   |
| CS4     | - 3.4.3.1                                           |
| J3      | - 2424.1                                            |

### 1482 4      implicit conversion from character, bit, and Boolean

|         |                                                                                |
|---------|--------------------------------------------------------------------------------|
| CHOL    | -                                                                              |
| IRONMAN | - 3-3D, 3-2D, 3-2C, 3-2B, 3B (character values serve directly as index values) |
| J73C    | + (bit only, none if RESTRICTED)                                               |
| J73I    | + 1.7.1 (bit only)                                                             |
| PASCAL  | - 7.2.1                                                                        |
| PLI     | + 6.2                                                                          |
| CS4     | - 3.4.3.1                                                                      |
| J3      | - 2424.1                                                                       |

### Array Data Type

1483 4 full syntactic range of integer valued expressions permitted

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | + 4D      |
| J73C    | +         |
| J73I    | + 4.11.1  |
| PASCAL  | + 7.2.1   |
| PLI     | + 6.2     |
| CS4     | + 3.4.3.1 |
| J3      | + 2424.1  |

1484 4 left-to-right evaluation order

|         |                           |
|---------|---------------------------|
| CHOL    | -                         |
| IRONMAN | - 4C, 10E                 |
| J73C    | -                         |
| J73I    | -                         |
| PASCAL  | -                         |
| PLI     | -                         |
| CS4     | ? 3.0, 3.4.3.1 (probably) |
| J3      | + 2491                    |

1485 4 evaluation order unspecified

|         |                                                                                      |
|---------|--------------------------------------------------------------------------------------|
| CHOL    | +                                                                                    |
| IRONMAN | + 4C, 10E (consistent with parameter evaluation and<br>built-in operator evaluation) |
| J73C    | +                                                                                    |
| J73I    | + 4.8.3                                                                              |
| PASCAL  | + 7.2.1                                                                              |
| PLI     | + 6                                                                                  |
| CS4     | ? (probably not)                                                                     |
| J3      | -                                                                                    |

1486 4 subscript range check

|         |                   |
|---------|-------------------|
| CHOL    | +                 |
| IRONMAN | o [3-3A, 3-3D]    |
| J73C    | + (if RESTRICTED) |
| J73I    | - 4.11            |
| PASCAL  | +                 |
| PLI     | + 10.4.16         |
| CS4     | + 3.4.3.1         |
| J3      | -                 |



# Array Data Type

- 1487 5 at compile-time
- CHOL +
  - IRONMAN + 10B, 13D
  - J73C + (if RESTRICTED)
  - J73I -
  - PASCAL ?
  - PLI -
  - CS4 + 3.4.3.1
  - J3 ? 2424.3
- 1488 5 exception condition or error abort
- CHOL +
  - IRONMAN + 10B, 13D
  - J73C + (if RESTRICTED)
  - J73I -
  - PASCAL + U14.B (PASCAL 6000-3.4)
  - PLI + 10.4.16
  - CS4 + 3.4.3.1
  - J3 - 2424.3
- 1489 6 optional check
- CHOL +
  - IRONMAN + 10G
  - J73C + (if RESTRICTED)
  - J73I -
  - PASCAL + U14.B
  - PLI + 10.2
  - CS4 + 7.3.2
  - J3 -
- 1490 7 compilation option
- CHOL +
  - IRONMAN o [10G]
  - J73C + (if RESTRICTED)
  - J73I n
  - PASCAL + U14.B
  - PLI -
  - CS4 -
  - J3 n
- 1491 7 specified in source code
- CHOL +
  - IRONMAN o [10G]
  - J73C + (if RESTRICTED)
  - J73I n
  - PASCAL -
  - PLI + 10.2
  - CS4 + 7.3.2
  - J3 n

## Array Data Type

|         |                                                            |
|---------|------------------------------------------------------------|
| 1492 6  | out of range subscript                                     |
| CHOL    | +                                                          |
| IRONMAN | + 10G                                                      |
| J73C    | + (if RESTRICTED)                                          |
| J73I    | -                                                          |
| PASCAL  | + U14.B                                                    |
| PLI     | + 10.4.16                                                  |
| CS4     | + 3.4.3.1                                                  |
| J3      | -                                                          |
| 1493 7  | range checks on assignment to subscript variables possible |
| CHOL    | o                                                          |
| IRONMAN | ? 10G                                                      |
| J73C    | o                                                          |
| J73I    | -                                                          |
| PASCAL  | + U14.B                                                    |
| PLI     | -                                                          |
| CS4     | + 3.2.1.3.2, 3.3.3.2                                       |
| J3      | -                                                          |
| 1494 6  | on access outside array area                               |
| CHOL    | -                                                          |
| IRONMAN | - 10G                                                      |
| J73C    | -                                                          |
| J73I    | -                                                          |
| PASCAL  | -                                                          |
| PLI     | -                                                          |
| CS4     | -                                                          |
| J3      | -                                                          |
| 1495 4  | yielding subarrays                                         |
| CHOL    | -                                                          |
| IRONMAN | + 3-3E (for one-dimensional arrays only)                   |
| J73C    | -                                                          |
| J73I    | - 4.11                                                     |
| PASCAL  | - 7.2.1                                                    |
| PLI     | + 6.3                                                      |
| CS4     | + 3.4.3.1                                                  |
| J3      | - 2424                                                     |
| 1496 5  | complete dimension                                         |
| CHOL    | n *                                                        |
| IRONMAN | - 3-3E                                                     |
| J73C    | n *                                                        |
| J73I    | -                                                          |
| PASCAL  | -                                                          |
| PLI     | + 6.3                                                      |
| CS4     | + 3.4.3.1                                                  |
| J3      | -                                                          |

## Array Data Type

|         |                                               |
|---------|-----------------------------------------------|
| 1497 6  | only rightmost indices may denote subarrays   |
| CHOL    | n *                                           |
| IRONMAN | n * 3-3E                                      |
| J73C    | n                                             |
| J73I    | n                                             |
| PASCAL  | n                                             |
| PLI     | - 6.3                                         |
| CS4     | + 3.4.3.1                                     |
| J3      | n                                             |
| 1498 5  | portion of a dimension                        |
| CHOL    | n *                                           |
| IRONMAN | + 3-3E (one-dimensional arrays only)          |
| J73C    | n *                                           |
| J73I    | -                                             |
| PASCAL  | -                                             |
| PLI     | - 6.3                                         |
| CS4     | -                                             |
| J3      | -                                             |
| 1499 5  | new lower bound specifiable                   |
| CHOL    | n *                                           |
| IRONMAN | - 1A, 3-3E                                    |
| J73C    | n *                                           |
| J73I    | -                                             |
| PASCAL  | -                                             |
| PLI     | - 6.3                                         |
| CS4     | -                                             |
| J3      | -                                             |
| 1500 5  | subarrays permitted wherever arrays permitted |
| CHOL    | n *                                           |
| IRONMAN | + 3-3E (one-dimensional arrays only)          |
| J73C    | n                                             |
| J73I    | n                                             |
| PASCAL  | n                                             |
| PLI     | + 6.3                                         |
| CS4     | + 3.4.3.1                                     |
| J3      | n                                             |
| 1501 6  | as sources                                    |
| CHOL    | n *                                           |
| IRONMAN | + 3-3E, 4D                                    |
| J73C    | n                                             |
| J73I    | n                                             |
| PASCAL  | n                                             |
| PLI     | + 6.3                                         |
| CS4     | + 3.4.3.1                                     |
| J3      | n                                             |

## Array Data Type

- 1502 6 as targets
- |         |            |
|---------|------------|
| CHOL    | n *        |
| IRONMAN | ? 3-3E, 4D |
| J73C    | n          |
| J73I    | n          |
| PASCAL  | n          |
| PLI     | + 6.3      |
| CS4     | + 3.4.3.1  |
| J3      | n          |
- 1503 4 object indexed may be yielded by an array valued expression
- |         |           |
|---------|-----------|
| CHOL    | -         |
| IRONMAN | - 1A      |
| J73C    | -         |
| J73I    | - 4.11    |
| PASCAL  | + 7.2.1   |
| PLI     | - 6.2     |
| CS4     | + 3.4.3.1 |
| J3      | - 2424.2  |
- 1504 4 access character string as an array
- |         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | + 3-3E     |
| J73C    | -          |
| J73I    | -          |
| PASCAL  | + 7.2.1, 4 |
| PLI     | -          |
| CS4     | + 3.6.3.1  |
| J3      | -          |
- 1505 5 yields single characters
- |         |            |
|---------|------------|
| CHOL    | -          |
| IRONMAN | + 3-3E     |
| J73C    | n          |
| J73I    | n          |
| PASCAL  | + 7.2.1, 4 |
| PLI     | n          |
| CS4     | + 3.6.3.1  |
| J3      | n          |
- 1506 5 yields substrings
- |         |        |
|---------|--------|
| CHOL    | +      |
| IRONMAN | + 3-3E |
| J73C    | n      |
| J73I    | n      |
| PASCAL  | -      |
| PLI     | n      |
| CS4     | -      |
| J3      | n      |



## Array Data Type

- 1507 4 indexing equivalent to other parameter usages
- |         |                                                          |
|---------|----------------------------------------------------------|
| CHOL    | +                                                        |
| IRONMAN | + 7A (if assignment and access are definable operations) |
| J73C    | +                                                        |
| J73I    | -                                                        |
| PASCAL  | -                                                        |
| PLI     | -                                                        |
| CS4     | -                                                        |
| J3      | -                                                        |
- 1508 5 array indexing notation distinct from procedure invocation
- |         |                                                            |
|---------|------------------------------------------------------------|
| CHOL    | o                                                          |
| IRONMAN | o [7A (if assignment and access are definable operations)] |
| J73C    | -                                                          |
| J73I    | + 4.11, 3.10, 4.10                                         |
| PASCAL  | + 7.2.1, 9.1.2                                             |
| PLI     | - 6.2, 6.7                                                 |
| CS4     | - 3.4.3.1, 5.2                                             |
| J3      | + 2424.2, 2446.6                                           |
- 1509 5 optional indices and optional parameters both/neither permitted
- |         |                     |
|---------|---------------------|
| CHOL    | +                   |
| IRONMAN | - 3-3E, 7A          |
| J73C    | +                   |
| J73I    | + 4.11, 3.10, 4.10  |
| PASCAL  | + 7.2.1, 8.2, 9.1.2 |
| PLI     | + 6.2, 6.7, 12.4    |
| CS4     | + 3.4.3.1, 5.2      |
| J3      | + 2424.2, 2446.6    |
- 1510 5 array trimming notation consistent with parameter notation
- |         |                                                                       |
|---------|-----------------------------------------------------------------------|
| CHOL    | n                                                                     |
| IRONMAN | + 7A, 3-3E (e.g., S(2,3) could mean get chars 2, 3, 4, from string S) |
| J73C    | n                                                                     |
| J73I    | n                                                                     |
| PASCAL  | n                                                                     |
| PLI     | - 6.3, 6.7                                                            |
| CS4     | - 3.4.3.1, 5.2                                                        |
| J3      | n                                                                     |



## Array Data Type

### 1511 3 matrix/vector operations...

|         |                |
|---------|----------------|
| CHOL    | -              |
| IRONMAN | o [3-3A, 3-3D] |
| J73C    | -              |
| J73I    | -              |
| PASCAL  | -              |
| PLI     | +              |
| CS4     | +              |
| J3      | -              |

### 1512 4 notation

|         |                |
|---------|----------------|
| CHOL    | n *            |
| IRONMAN | o [3-3A, 3-3D] |
| J73C    | n *            |
| J73I    | -              |
| PASCAL  | -              |
| PLI     | +              |
| CS4     | +              |
| J3      | -              |

### 1513 5 infix notation

|         |                                    |
|---------|------------------------------------|
| CHOL    | n                                  |
| IRONMAN | + 7A                               |
| J73C    | n                                  |
| J73I    | n                                  |
| PASCAL  | n                                  |
| PLI     | + 7.1.3 (componentwise operations) |
| CS4     | + B.VECTOR, B.MATRIX               |
| J3      | n                                  |

### 1514 5 procedural

|         |                      |
|---------|----------------------|
| CHOL    | n                    |
| IRONMAN | - 7A                 |
| J73C    | n                    |
| J73I    | n                    |
| PASCAL  | n                    |
| PLI     | + 13.4.2             |
| CS4     | + B.VECTOR, B.MATRIX |
| J3      | n                    |

### 1515 4 matrix multiplication

|         |                      |
|---------|----------------------|
| CHOL    | n *                  |
| IRONMAN | o 1A                 |
| J73C    | n *                  |
| J73I    | -                    |
| PASCAL  | -                    |
| PLI     | -                    |
| CS4     | + B.VECTOR, B.MATRIX |
| J3      | -                    |

# Array Data Type

## 1516 4 scalar vector product

CHOL n \*  
 IRONMAN o 1A  
 J73C n \*  
 J73I -  
 PASCAL -  
 PLI + 13.4.2  
 CS4 + B.VECTOR  
 J3 -

## 1517 4 vector cross product

CHOL n \*  
 IRONMAN o 1A  
 J73C n \*  
 J73I -  
 PASCAL -  
 PLI -  
 CS4 + B.VECTOR  
 J3 -

## 1518 4 transpose

CHOL n \*  
 IRONMAN o 1A  
 J73C n \*  
 J73I -  
 PASCAL -  
 PLI -  
 CS4 + B.MATRIX  
 J3 -

## 1519 4 matrix addition and subtraction

CHOL n \*  
 IRONMAN o [3-3A, 3-3D]  
 J73C n \*  
 J73I -  
 PASCAL -  
 PLI + 7.1.2, 7.1.3, 7.3.1 (componentwise)  
 CS4 + B.MATRIX, B.VECTOR  
 J3 -

## 1520 4 inverse

CHOL n \*  
 IRONMAN o 1A  
 J73C n \*  
 J73I -  
 PASCAL -  
 PLI -  
 CS4 + B.MATRIX  
 J3 -

# Array Data Type

## 1521 4 determinant

CHOL n \*  
 IRONMAN o 1A  
 J73C n \*  
 J73I -  
 PASCAL -  
 PLI -  
 CS4 + B.MATRIX  
 J3 -

## 1522 4 equality/inequality

CHOL n \*  
 IRONMAN + 7A (by extension)  
 J73C n \*  
 J73I -  
 PASCAL -  
 PLI -  
 CS4 + B.VECTOR, B.MATRIX  
 J3 -

## 1523 3 HBOUND and LBOUND

CHOL o  
 IRONMAN o 7H (might be given by bounds name)  
 J73C +  
 J73I -  
 PASCAL -  
 PLI + 13.4.3, 13.4.4  
 CS4 + 3.4.2.2, 3.4.2.3  
 J3 -

## 1524 3 EXTENT

CHOL o  
 IRONMAN o 1A  
 J73C +  
 J73I -  
 PASCAL -  
 PLI + 13.4.1  
 CS4 + 3.4.2.4  
 J3 -

## 1525 3 SIZE function

CHOL o  
 IRONMAN o 1A  
 J73C +  
 J73I + 4.10.10  
 PASCAL -  
 PLI + 13.6.16  
 CS4 -  
 J3 -

## Array Data Type

### 1526 3 component-wise scalar operations

|         |                        |
|---------|------------------------|
| CHOL    | -                      |
| IRONMAN | o 3-3E (by extension?) |
| J73C    | -                      |
| J73I    | -                      |
| PASCAL  | -                      |
| PLI     | + 7.1.2, 7.1.3         |
| CS4     | -                      |
| J3      | -                      |

### 1527 4 arithmetic operations

|         |                          |
|---------|--------------------------|
| CHOL    | n *                      |
| IRONMAN | o [3-3E (by extension?)] |
| J73C    | n *                      |
| J73I    | -                        |
| PASCAL  | -                        |
| PLI     | + 7.3.1                  |
| CS4     | -                        |
| J3      | -                        |

### 1528 4 relational operations

|         |                          |
|---------|--------------------------|
| CHOL    | n *                      |
| IRONMAN | o [3-3E (by extension?)] |
| J73C    | n *                      |
| J73I    | -                        |
| PASCAL  | -                        |
| PLI     | + 7.3.4                  |
| CS4     | -                        |
| J3      | -                        |

### 1529 4 implicit conversions

|         |                |
|---------|----------------|
| CHOL    | n *            |
| IRONMAN | n 3B           |
| J73C    | n *            |
| J73I    | -              |
| PASCAL  | -              |
| PLI     | + 7.1.2, 7.1.3 |
| CS4     | -              |
| J3      | -              |

### 1530 4 explicit conversions

|         |              |
|---------|--------------|
| CHOL    | n *          |
| IRONMAN | + 3B         |
| J73C    | n *          |
| J73I    | -            |
| PASCAL  | -            |
| PLI     | + 13.1, 13.2 |
| CS4     | -            |
| J3      | -            |

## Array Data Type

|      |   |                                                                       |
|------|---|-----------------------------------------------------------------------|
| 1531 | 4 | bounds or extents match as in assignment                              |
|      |   | CHOL        n                                                         |
|      |   | IRONMAN    o [3-3E (by extension?)]                                   |
|      |   | J73C        n                                                         |
|      |   | J73I        n                                                         |
|      |   | PASCAL     n                                                          |
|      |   | PLI        + 9.3                                                      |
|      |   | CS4        n                                                          |
|      |   | J3          n                                                         |
| 1532 | 4 | scalar operand expanded to conformable array with same element values |
|      |   | CHOL        n *                                                       |
|      |   | IRONMAN    o 1C                                                       |
|      |   | J73C        n *                                                       |
|      |   | J73I        -                                                         |
|      |   | PASCAL     -                                                          |
|      |   | PLI        + 9.1, 9.2, 9.3                                            |
|      |   | CS4        -                                                          |
|      |   | J3          -                                                         |
| 1533 | 3 | relational operations                                                 |
|      |   | CHOL        +                                                         |
|      |   | IRONMAN    - 1A                                                       |
|      |   | J73C        +                                                         |
|      |   | J73I        - 4.6                                                     |
|      |   | PASCAL     - 8.14                                                     |
|      |   | PLI        -                                                          |
|      |   | CS4        + 3.4.4.1                                                  |
|      |   | J3          - 2437, 2439.1                                            |
| 1534 | 4 | equality/inequality                                                   |
|      |   | CHOL        +                                                         |
|      |   | IRONMAN    n * [1A]                                                   |
|      |   | J73C        +                                                         |
|      |   | J73I        -                                                         |
|      |   | PASCAL     -                                                          |
|      |   | PLI        -                                                          |
|      |   | CS4        + 3.4.4.1                                                  |
|      |   | J3          -                                                         |
| 1535 | 4 | algebraic comparisons                                                 |
|      |   | CHOL        -                                                         |
|      |   | IRONMAN    n * [1A]                                                   |
|      |   | J73C        -                                                         |
|      |   | J73I        -                                                         |
|      |   | PASCAL     -                                                          |
|      |   | PLI        -                                                          |
|      |   | CS4        -                                                          |
|      |   | J3          -                                                         |



## Array Data Type

### 1536 3 assignment

|         |                |
|---------|----------------|
| CHOL    | +              |
| IRONMAN | + 3-3E, 5F     |
| J73C    | +              |
| J73I    | - 3.3          |
| PASCAL  | + 9.1.1        |
| PLI     | + 12.2         |
| CS4     | + 4.2, 3.4.3.2 |
| J3      | - 2442         |

### 1537 4 no representation transformation permitted

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | + 3B    |
| J73C    | +       |
| J73I    | n       |
| PASCAL  | + 9.1.1 |
| PLI     | -       |
| CS4     | -       |
| J3      | n       |

### 1538 4 packing conversions permitted

|         |         |
|---------|---------|
| CHOL    | -       |
| IRONMAN | + 11B   |
| J73C    | -       |
| J73I    | n       |
| PASCAL  | - 9.1.1 |
| PLI     | + 12.2  |
| CS4     | n       |
| J3      | n       |

### 1539 4 representational transforms are permitted

|         |        |
|---------|--------|
| CHOL    | -      |
| IRONMAN | - 3B   |
| J73C    | -      |
| J73I    | n      |
| PASCAL  | -      |
| PLI     | + 12.2 |
| CS4     | -      |
| J3      | n      |

## Array Data Type

|      |   |                                                                                 |
|------|---|---------------------------------------------------------------------------------|
| 1540 | 4 | same conversions as in scalar assignments                                       |
|      |   | CHOL +                                                                          |
|      |   | IRONMAN + 3B (i.e., none, except for floating pt. accuracy and fixed pt. range) |
|      |   | J73C +                                                                          |
|      |   | J73I n                                                                          |
|      |   | PASCAL -                                                                        |
|      |   | PLI + 12.2                                                                      |
|      |   | CS4 + 3.4.3.2 (precision)                                                       |
|      |   | J3 n                                                                            |
| 1541 | 4 | exact bounds match required                                                     |
|      |   | CHOL +                                                                          |
|      |   | IRONMAN o [3-3E, 5F]                                                            |
|      |   | J73C +                                                                          |
|      |   | J73I n                                                                          |
|      |   | PASCAL + 9.1.1                                                                  |
|      |   | PLI -                                                                           |
|      |   | CS4 -                                                                           |
|      |   | J3 n                                                                            |
| 1542 | 4 | identical extents allowed                                                       |
|      |   | CHOL -                                                                          |
|      |   | IRONMAN o [3-3E, 5F]                                                            |
|      |   | J73C -                                                                          |
|      |   | J73I n                                                                          |
|      |   | PASCAL -                                                                        |
|      |   | PLI + 12.2, 9.3                                                                 |
|      |   | CS4 + 3.4.3.2                                                                   |
|      |   | J3 n                                                                            |
| 1543 | 4 | scalar source                                                                   |
|      |   | CHOL -                                                                          |
|      |   | IRONMAN o [3-3E, 5F]                                                            |
|      |   | J73C -                                                                          |
|      |   | J73I n                                                                          |
|      |   | PASCAL - 9.1.1                                                                  |
|      |   | PLI + 12.2                                                                      |
|      |   | CS4 - 4.2                                                                       |
|      |   | J3 n                                                                            |

## Array Data Type

1544 5 converted to a single element array

|         |      |
|---------|------|
| CHOL    | n *  |
| IRONMAN | o 5E |
| J73C    | n    |
| J73I    | n    |
| PASCAL  | n    |
| PLI     | -    |
| CS4     | n    |
| J3      | n    |

1545 5 assigned to each element of target array

|         |             |
|---------|-------------|
| CHOL    | n *         |
| IRONMAN | o 5E        |
| J73C    | n           |
| J73I    | n           |
| PASCAL  | n           |
| PLI     | + 12.2, 9.3 |
| CS4     | n           |
| J3      | n           |

1546 3 expression evaluation...

|         |                    |
|---------|--------------------|
| CHOL    | o {1.2.1}          |
| IRONMAN | o {3-3A, 3-3D}     |
| J73C    | o {1.2.1 (tables)} |
| J73I    | -                  |
| J3      | - 2431             |

1547 4 implicit conversion in evaluating operands

|         |                |
|---------|----------------|
| CHOL    | -              |
| IRONMAN | - 3B           |
| J73C    | -              |
| J73I    | n              |
| PASCAL  | - 8            |
| PLI     | + 7.1.2, 7.1.3 |
| CS4     | -              |
| J3      | n              |

1548 5 scalar expanded to array

|         |        |
|---------|--------|
| CHOL    | n *    |
| IRONMAN | n * 5E |
| J73C    | n *    |
| J73I    | n      |
| PASCAL  | -      |
| PLI     | + 9.3  |
| CS4     | -      |
| J3      | n      |

## Array Data Type

1549 6      to single element array

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n * [5E] |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | -        |
| CS4     | n        |
| J3      | n        |

1550 6      to multiple element array

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n * [5E] |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | + 9.3    |
| CS4     | n        |
| J3      | n        |

1551 5      packing conversions

|         |                     |
|---------|---------------------|
| CHOL    | n *                 |
| IRONMAN | + 11B               |
| J73C    | n *                 |
| J73I    | n                   |
| PASCAL  | -                   |
| PLI     | + 8.1, 7.1.2, 7.1.3 |
| CS4     | n                   |
| J3      | n                   |

1552 4      evaluation order of operands...

|         |                                                    |
|---------|----------------------------------------------------|
| CHOL    | o [1.2.1]                                          |
| IRONMAN | . (by operator extension except for concatenation) |
| J73C    | o [1.2.1 (tables)]                                 |
| J73I    | n                                                  |
| J3      | n                                                  |

1553 5      strictly left-to-right

|         |               |
|---------|---------------|
| CHOL    | -             |
| IRONMAN | - 7A, 4C, 10E |
| J73C    | -             |
| J73I    | n             |
| PASCAL  | -             |
| PLI     | -             |
| CS4     | + 3.0         |
| J3      | n             |

## Array Data Type

### 1554 5 left-to-right within equal precedence

|         |               |
|---------|---------------|
| CHOL    | -             |
| IRONMAN | - 7A, 4C, 10E |
| J73C    | -             |
| J73I    | n             |
| PASCAL  | -             |
| PLI     | -             |
| CS4     | -             |
| J3      | n             |

### 1555 5 order not specified

|         |               |
|---------|---------------|
| CHOL    | +             |
| IRONMAN | + 7A, 4C, 10E |
| J73C    | +             |
| J73I    | n             |
| PASCAL  | + 8           |
| PLI     | + 7.1.4       |
| CS4     | -             |
| J3      | n             |

### 1556 3 constant expression evaluation

|         |                                                          |
|---------|----------------------------------------------------------|
| CHOL    | +                                                        |
| IRONMAN | - 3-3E (by extension implies no compile-time operations) |
| J73C    | +                                                        |
| J73I    | - 4.9                                                    |
| PASCAL  | -                                                        |
| PLI     | -                                                        |
| CS4     | + 7.1                                                    |
| J3      | -                                                        |

### 1557 4 indexing

|         |                             |
|---------|-----------------------------|
| CHOL    | +                           |
| IRONMAN | + 5A (for read-only arrays) |
| J73C    | +                           |
| J73I    | -                           |
| PASCAL  | -                           |
| PLI     | -                           |
| CS4     | -                           |
| J3      | -                           |

### 1558 4 matrix operations

|         |   |
|---------|---|
| CHOL    | n |
| IRONMAN | n |
| J73C    | n |
| J73I    | n |
| PASCAL  | n |
| PLI     | - |
| CS4     | - |
| J3      | n |



## Array Data Type

|      |   |                                  |                    |
|------|---|----------------------------------|--------------------|
| 1559 | 4 | HBOUND and LBOUND                |                    |
|      |   | CHOL                             | +                  |
|      |   | IRONMAN                          | n * 4E, 7H         |
|      |   | J73C                             | +                  |
|      |   | J73I                             | n                  |
|      |   | PASCAL                           | n                  |
|      |   | PLI                              | -                  |
|      |   | CS4                              | + 3.4.2.2, 3.4.2.3 |
|      |   | J3                               | n                  |
| 1560 | 4 | EXTENT                           |                    |
|      |   | CHOL                             | +                  |
|      |   | IRONMAN                          | n                  |
|      |   | J73C                             | +                  |
|      |   | J73I                             | n                  |
|      |   | PASCAL                           | n                  |
|      |   | PLI                              | -                  |
|      |   | CS4                              | + 3.4.2.4          |
|      |   | J3                               | n                  |
| 1561 | 4 | SIZE                             |                    |
|      |   | CHOL                             | +                  |
|      |   | IRONMAN                          | n                  |
|      |   | J73C                             | +                  |
|      |   | J73I                             | -                  |
|      |   | PASCAL                           | n                  |
|      |   | PLI                              | -                  |
|      |   | CS4                              | n                  |
|      |   | J3                               | n                  |
| 1562 | 4 | number of dimensions             |                    |
|      |   | CHOL                             | +                  |
|      |   | IRONMAN                          | n * 3-3E           |
|      |   | J73C                             | +                  |
|      |   | J73I                             | -                  |
|      |   | PASCAL                           | -                  |
|      |   | PLI                              | -                  |
|      |   | CS4                              | + 3.4.2.1          |
|      |   | J3                               | -                  |
| 1563 | 4 | component-wise scalar operations |                    |
|      |   | CHOL                             | n                  |
|      |   | IRONMAN                          | n                  |
|      |   | J73C                             | n                  |
|      |   | J73I                             | n                  |
|      |   | PASCAL                           | n                  |
|      |   | PLI                              | -                  |
|      |   | CS4                              | n                  |
|      |   | J3                               | n                  |

## Array Data Type

### 1564 4 relational operations

|         |                                                              |
|---------|--------------------------------------------------------------|
| CHOL    | +                                                            |
| IRONMAN | n * [3-3E (by extension implies no compile-time operations)] |
| J73C    | +                                                            |
| J73I    | n                                                            |
| PASCAL  | n                                                            |
| PLI     | n                                                            |
| CS4     | -                                                            |
| J3      | n                                                            |

### 1565 4 access read-only initialized array

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | + 5A, 4E |
| J73C    | +        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | -        |
| J3      | n        |

### 1566 3 explicit conversions

|         |                |
|---------|----------------|
| CHOL    | +              |
| IRONMAN | o [3-3A, 3-3D] |
| J73C    | +              |
| J73I    | -              |
| PASCAL  | +              |
| PLI     | -              |
| CS4     | + 3.4.4.2      |
| J3      | -              |

### 1567 4 scalar expanded to array

|         |                |
|---------|----------------|
| CHOL    | +              |
| IRONMAN | o [3-3A, 3-3D] |
| J73C    | +              |
| J73I    | -              |
| PASCAL  | -              |
| PLI     | -              |
| CS4     | +              |
| J3      | -              |

## Array Data Type

- 1568 5      to single element array
- CHOL      -
  - IRONMAN   - 5E, 3-3C, 2H (i.e., character literals are strings)
  - J73C      -
  - J73I      -
  - PASCAL    -
  - PLI       -
  - CS4       + 3.4.4.2
  - J3        -
- 1569 5      to multiple element array with same element values
- CHOL      +
  - IRONMAN   + 5E, 3-3C (to initialize array with bounds fixed at run time)
  - J73C      +
  - J73I      -
  - PASCAL    -
  - PLI       -
  - CS4       -
  - J3        -
- 1570 4      packing conversions
- CHOL      +
  - IRONMAN   - 11B, 12C (implicit conversion required)
  - J73C      +
  - J73I      -
  - PASCAL    + 10.1.3
  - PLI       -
  - CS4       -
  - J3        -
- 1571 3      exception conditions
- CHOL      +
  - IRONMAN   o [3-3A, 3-3D]
  - J73C      +
  - J73I      -
  - PASCAL    +
  - PLI       +
  - CS4       +
  - J3        -

# Array Data Type

|      |   |                 |                                                                             |
|------|---|-----------------|-----------------------------------------------------------------------------|
| 1572 | 4 | overflow        |                                                                             |
|      |   | CHOL            | -                                                                           |
|      |   | IRONMAN         | n                                                                           |
|      |   | J73C            | -                                                                           |
|      |   | J73I            | -                                                                           |
|      |   | PASCAL          | -                                                                           |
|      |   | PLI             | -                                                                           |
|      |   | CS4             | ? B.MATRIX                                                                  |
|      |   | J3              | -                                                                           |
| 1573 | 4 | singular matrix |                                                                             |
|      |   | CHOL            | -                                                                           |
|      |   | IRONMAN         | n                                                                           |
|      |   | J73C            | -                                                                           |
|      |   | J73I            | -                                                                           |
|      |   | PASCAL          | -                                                                           |
|      |   | PLI             | -                                                                           |
|      |   | CS4             | + B.MATRIX                                                                  |
|      |   | J3              | -                                                                           |
| 1574 | 4 | conformability  |                                                                             |
|      |   | CHOL            | -                                                                           |
|      |   | IRONMAN         | + 10B, 3-3D (not compile-time determinable for arrays with run-time bounds) |
|      |   | J73C            | -                                                                           |
|      |   | J73I            | -                                                                           |
|      |   | PASCAL          | -                                                                           |
|      |   | PLI             | -                                                                           |
|      |   | CS4             | + B.MATRIX, 3.4.3.2                                                         |
|      |   | J3              | -                                                                           |
| 1575 | 4 | subscript range |                                                                             |
|      |   | CHOL            | +                                                                           |
|      |   | IRONMAN         | + 10B, 13D                                                                  |
|      |   | J73C            | + (if RESTRICTED)                                                           |
|      |   | J73I            | -                                                                           |
|      |   | PASCAL          | + 14.B (PASCAL 6000-3.4)                                                    |
|      |   | PLI             | + 10.4.16                                                                   |
|      |   | CS4             | + 3.4.3.1                                                                   |
|      |   | J3              | -                                                                           |

## Structure Data Type

### 1576 2 Structure Data Type

|         |                                              |
|---------|----------------------------------------------|
| CHOL    | + 1.2.1                                      |
| IRONMAN | + 3-3A                                       |
| J73C    | + 1.2.1 (tables, blocks)                     |
| J73I    | + (tables, blocks)                           |
| PASCAL  | + 6.2.2, 7.2.2                               |
| PLI     | +                                            |
| CS4     | + 3.5                                        |
| J3      | + (tables, i.e., 1-dim arrays of structures) |

### 1577 3 components may be...

|         |                            |
|---------|----------------------------|
| CHOL    | o [1.2.1]                  |
| IRONMAN | o [3-3A]                   |
| J73C    | o [1.2.1 (tables, blocks)] |

### 1578 4 of any scalar type

|         |                     |
|---------|---------------------|
| CHOL    | +                   |
| IRONMAN | + 3-3B              |
| J73C    | +                   |
| J73I    | + 2.1.5.6, 2.1.5.7  |
| PASCAL  | + 6.2.2             |
| PLI     | + 4.2.2             |
| CS4     | + 3.5.1             |
| J3      | + 2472.1-.2, 2474.1 |

### 1579 4 of array type

|         |                          |
|---------|--------------------------|
| CHOL    | +                        |
| IRONMAN | + 3-3B                   |
| J73C    | +                        |
| J73I    | + 2.1.6 (in blocks only) |
| PASCAL  | + 6.2.2                  |
| PLI     | + 4.2.2                  |
| CS4     | + 3.5.1                  |
| J3      | + 2474.2 (1-dim only)    |

### 1580 4 of structure type

|         |                          |
|---------|--------------------------|
| CHOL    | +                        |
| IRONMAN | + 3-3B                   |
| J73C    | +                        |
| J73I    | + 2.1.6 (in blocks only) |
| PASCAL  | + 6.2.2                  |
| PLI     | + 4.2.2                  |
| CS4     | + 3.5.1                  |
| J3      | -                        |



## Structure Data Type

|      |   |                                         |                                              |
|------|---|-----------------------------------------|----------------------------------------------|
| 1581 | 4 | label type                              |                                              |
|      |   | CHOL                                    | -                                            |
|      |   | IRONMAN                                 | - 5D                                         |
|      |   | J73C                                    | -                                            |
|      |   | J73I                                    | -                                            |
|      |   | PASCAL                                  | -                                            |
|      |   | PLI                                     | + 4.2.2                                      |
|      |   | CS4                                     | -                                            |
|      |   | J3                                      | -                                            |
| 1582 | 4 | procedure type                          |                                              |
|      |   | CHOL                                    | +                                            |
|      |   | IRONMAN                                 | - 5D                                         |
|      |   | J73C                                    | +                                            |
|      |   | J73I                                    | -                                            |
|      |   | PASCAL                                  | -                                            |
|      |   | PLI                                     | + 4.2.2                                      |
|      |   | CS4                                     | -                                            |
|      |   | J3                                      | -                                            |
| 1583 | 4 | read-only (unevaluated) expression type |                                              |
|      |   | CHOL                                    | -                                            |
|      |   | IRONMAN                                 | + 3-3G                                       |
|      |   | J73C                                    | -                                            |
|      |   | J73I                                    | -                                            |
|      |   | PASCAL                                  | -                                            |
|      |   | PLI                                     | -                                            |
|      |   | CS4                                     | -                                            |
|      |   | J3                                      | -                                            |
| 1584 | 4 | union type                              |                                              |
|      |   | CHOL                                    | + (variant records)                          |
|      |   | IRONMAN                                 | + 3-3B, 3-3H (variant records are required)  |
|      |   | J73C                                    | + (variant records, overlays in blocks)      |
|      |   | J73I                                    | + 2.1.6 (overlays, in blocks only)           |
|      |   | PASCAL                                  | + (variant records)                          |
|      |   | PLI                                     | -                                            |
|      |   | CS4                                     | + 3.5.1                                      |
|      |   | J3                                      | -                                            |
| 1585 | 4 | other types                             |                                              |
|      |   | CHOL                                    | + (Bit string, character string)             |
|      |   | IRONMAN                                 | + 3-3B                                       |
|      |   | J73C                                    | + (bit string, character string)             |
|      |   | J73I                                    | -                                            |
|      |   | PASCAL                                  | + 6.2.2 (set, file)                          |
|      |   | PLI                                     | + 4.2.2 (file, area, format)                 |
|      |   | CS4                                     | + 3.5.1 (set, matrix, vector)                |
|      |   | J3                                      | + 2472.1-.2, 2474.1 (dual, character string) |

# Structure Data Type

- 1586 4 any specifiable type (of variables)
- |         |                           |
|---------|---------------------------|
| CHOL    | +                         |
| IRONMAN | + 3-3B, 3-3I              |
| J73C    | +                         |
| J73I    | + 2.1.5.6, 2.1.5.7, 2.1.6 |
| PASCAL  | + 6.2.2                   |
| PLI     | + 4.2.2                   |
| CS4     | + 3.5.1                   |
| J3      | - 2472.1-.2, 2474.1       |
- 1587 4 filler fields permitted
- |         |            |
|---------|------------|
| CHOL    | o          |
| IRONMAN | + 11A, 12C |
| J73C    | o          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | -          |
| J3      | -          |
- 1588 4 serial vs. parallel structure
- |         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | + 3-3B, 11A, 12C |
| J73C    | +                |
| J73I    | +                |
| PASCAL  | +                |
| PLI     | +                |
| CS4     | +                |
| J3      | +                |
- 1589 5 as in PL/I
- |         |                          |
|---------|--------------------------|
| CHOL    | o                        |
| IRONMAN | o 3-3B, 11A, 12C         |
| J73C    | -                        |
| J73I    | -                        |
| PASCAL  | -                        |
| PLI     | + 4.2.2, 4.2.3, 6.2, 6.4 |
| CS4     | -                        |
| J3      | -                        |
- 1590 5 as in JOVIAL
- |         |            |
|---------|------------|
| CHOL    | o          |
| IRONMAN | o 11A, 12C |
| J73C    | +          |
| J73I    | + 2.1.5.4  |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | -          |
| J3      | + 2473.3   |

# Structure Data Type

- 1591 5 as in PASCAL
- CHOL o
  - IRONMAN o 11A
  - J73C -
  - J73I -
  - PASCAL + 6.2.2, 6.2.1, 7.2.2, 7.2.1
  - PLI -
  - CS4 + 3.5.1, 3.4.1, 3.5.3.1, 3.4.3.1
  - J3 -
- 1592 3 structure component names must be mutually distinct...
- CHOL o [1.2.1]
  - IRONMAN . 3-3A
  - J73C o [1.2.1 (tables, blocks)]
  - J73I 1.3.3, 2.1.5, 2.1.6
  - J3 2489
- 1593 4 for immediate field names of a (sub) structure
- CHOL +
  - IRONMAN o [3-3A]
  - J73C +
  - J73I + 2.1.5.6, 2.1.5.7, 2.1.6
  - PASCAL + 6.2.2
  - PLI + 5.1, 6.4, 6.5
  - CS4 + 3.5.1
  - J3 + 2472.1-.3, 2474.1-.2
- 1594 4 for each variant's immediate field names
- CHOL +
  - IRONMAN o [3-3A]
  - J73C +
  - J73I + 2.1.5.7, 2.1.6
  - PASCAL + 6.2.2
  - PLI n
  - CS4 n
  - J3 + 2472.5-.10, 2474
- 1595 4 for all variant's immediate field names
- CHOL -
  - IRONMAN o [3-3A]
  - J73C -
  - J73I + 2.1.5.7, 2.1.6
  - PASCAL + 6.2.2, U7.1
  - PLI n
  - CS4 n
  - J3 + 2472.5-.10, 2474

## Structure Data Type

- 1596 4     within a major structure
- CHOL       -
  - IRONMAN   o [3-3A]
  - J73C       -
  - J73I       + 2.1.5.6, 2.1.5.7, 2.1.6
  - PASCAL     -
  - PLI        -
  - CS4        -
  - J3         + 2472, 2474, 2476
- 1597 4     within distinct major structures
- CHOL       -
  - IRONMAN   o [3-3A]
  - J73C       -
  - J73I       + 1.3.3, 2.1.5.6, 2.1.5.7, 2.1.6
  - PASCAL     -
  - PLI        -
  - CS4        -
  - J3         + 2471-6
- 1598 3     variant structures
- CHOL       +
  - IRONMAN   + 3-3H
  - J73C       + (only)
  - J73I       + 2.1.5.7, 2.1.6 (via overlays, no tag field)
  - PASCAL     + 6.2.2
  - PLI        -
  - CS4        -
  - J3         + 2472.5-.10, 2474 (via overlays, no tag field)
- 1599 4     tail type signified with tag bits
- CHOL       +
  - IRONMAN   + 3-3H, 3-3G
  - J73C       +
  - J73I       -
  - PASCAL     + 6.2.2
  - PLI        n
  - CS4        n
  - J3         -
- 1600 4     tag storage position under programmer control
- CHOL       +
  - IRONMAN   + 11A, 12C
  - J73C       +
  - J73I       n
  - PASCAL     - 6.2.2 (partly)
  - PLI        n
  - CS4        n
  - J3         n

## Structure Data Type

1601 4 tag need not be stored

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | + 3-3G  |
| J73C    | +       |
| J73I    | n       |
| PASCAL  | + 6.2.2 |
| PLI     | n       |
| CS4     | n       |
| J3      | n       |

1602 4 safe access to "tagless" structures

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | + 3B, 6C |
| J73C    | +        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | n        |
| CS4     | n        |
| J3      | -        |

1603 4 unsafe access to "tagged" structures

|         |         |
|---------|---------|
| CHOL    | -       |
| IRONMAN | - 3B    |
| J73C    | -       |
| J73I    | n       |
| PASCAL  | + 7.2.2 |
| PLI     | n       |
| CS4     | n       |
| J3      | n       |

1604 4 no implicit run-time type checking

|         |                |
|---------|----------------|
| CHOL    | +              |
| IRONMAN | + 1D, 6C       |
| J73C    | +              |
| J73I    | +              |
| PASCAL  | + 7.2.2, 6.2.2 |
| PLI     | n              |
| CS4     | n              |
| J3      | +              |

1605 3 run-time specification of bounds and lengths

|         |                                               |
|---------|-----------------------------------------------|
| CHOL    | +                                             |
| IRONMAN | o [3-3A]                                      |
| J73C    | +                                             |
| J73I    | - 2.1.5.3 (compile time constant bounds only) |
| PASCAL  | - 6.2.1 (compile-time constant bounds only)   |
| PLI     | +                                             |
| CS4     | +                                             |
| J3      | - 2471-6 (compile time constant bounds only)  |



## Structure Data Type

- 1601 4    tag need not be stored
- |         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | + 3-3G  |
| J73C    | +       |
| J73I    | n       |
| PASCAL  | + 6.2.2 |
| PLI     | n       |
| CS4     | n       |
| J3      | n       |
- 
- 1602 4    safe access to "tagless" structures
- |         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | + 3B, 6C |
| J73C    | +        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | n        |
| CS4     | n        |
| J3      | -        |
- 
- 1603 4    unsafe access to "tagged" structures
- |         |         |
|---------|---------|
| CHOL    | -       |
| IRONMAN | - 3B    |
| J73C    | -       |
| J73I    | n       |
| PASCAL  | + 7.2.2 |
| PLI     | n       |
| CS4     | n       |
| J3      | n       |
- 
- 1604 4    no implicit run-time type checking
- |         |                |
|---------|----------------|
| CHOL    | +              |
| IRONMAN | + 1D, 6C       |
| J73C    | +              |
| J73I    | +              |
| PASCAL  | + 7.2.2, 6.2.2 |
| PLI     | n              |
| CS4     | n              |
| J3      | +              |
- 
- 1605 3    run-time specification of bounds and lengths
- |         |                                               |
|---------|-----------------------------------------------|
| CHOL    | +                                             |
| IRONMAN | o [3-3A]                                      |
| J73C    | +                                             |
| J73I    | - 2.1.5.3 (compile time constant bounds only) |
| PASCAL  | - 6.2.1 (compile-time constant bounds only)   |
| PLI     | +                                             |
| CS4     | +                                             |
| J3      | - 2471-6 (compile time constant bounds only)  |

## Structure Data Type

- 1606 4    same as array bounds
- CHOL    +
  - IRONMAN + 3-3B, 3-3D, 3-3I
  - J73C    +
  - J73I    + 2.1.6 (blocks only)
  - PASCAL + 6.2.1, 6.2.2
  - PLI    + 4.3.2
  - CS4    + 3.5.1, 3.4.1
  - J3    - 2468.1, 2474.2
- 1607 4    same as for scalar strings
- CHOL    +
  - IRONMAN + 3-3B, 3-3D, 3-3I
  - J73C    +
  - J73I    + 2.1.5.6, 2.1.5.7, 2.1.6
  - PASCAL + 6.2.1, 6.2.2
  - PLI    + 4.3.2
  - CS4    + 3.5.1, 3.6.1
  - J3    + 2463.12, 2464.1, 2472.1, 2474.1
- 1608 4    string and array bounds specified similarly
- CHOL    +
  - IRONMAN + 3-3B, 3-3D, 3-3I
  - J73C    +
  - J73I    + 2.1.5.6, 2.1.5.7, 2.1.6
  - PASCAL + 6.2.1, 6.2.2
  - PLI    + 4.3.2
  - CS4    + 3.5.1, 3.4.1, 3.6.1
  - J3    - 2474.1-2
- 1609 4    explicitly stored bounds and lengths within structure
- CHOL    +
  - IRONMAN + 12D, 3-3B, 3-3B
  - J73C    +
  - J73I    -
  - PASCAL -
  - PLI    + 4.3.2.5
  - CS4    -
  - J3    -
- 1610 3    packing attributes
- CHOL    o [1.2.1]
  - IRONMAN o [3-3A]
  - J73C    o [1.2.1 (tables, blocks)]

# Structure Data Type

1611 4 machine-independent

CHOL +  
IRONMAN + 11B, 12C, 11F  
J73C +  
J73I +  
PASCAL + 6.2  
PLI + 4.3.1  
CS4 -  
J3 +

1612 5 different for different substructures

CHOL +  
IRONMAN o [11B, 12C, 11F]  
J73C +  
J73I + 2.1.6, 2.1.5.5  
PASCAL + 6.2  
PLI + 4.3.1.2  
CS4 -  
J3 n

1613 5 tight

CHOL +  
IRONMAN o [11B, 12C, 11F]  
J73C +  
J73I -  
PASCAL ?  
PLI -  
CS4 -  
J3 -

1614 5 dense

CHOL +  
IRONMAN o [11B, 12C, 11F]  
J73C +  
J73I + 2.1.5.5  
PASCAL ?  
PLI + 5.4.52, 4.3.1.2  
CS4 -  
J3 + 2471.6-.7, 2473.5

1615 5 medium

CHOL +  
IRONMAN o [11B, 12C, 11F]  
J73C +  
J73I + 2.1.5.5  
PASCAL ?  
PLI -  
CS4 -  
J3 + 2471.4-.5, 2471.7, 2473.5

# Structure Data Type

|      |   |                                             |         |                   |
|------|---|---------------------------------------------|---------|-------------------|
| 1616 | 5 | unpacked                                    | CHOL    | +                 |
|      |   |                                             | IRONMAN | o [11B, 12C, 11F] |
|      |   |                                             | J73C    | +                 |
|      |   |                                             | J73I    | + 2.1.5.5         |
|      |   |                                             | PASCAL  | + 6.2             |
|      |   |                                             | PLI     | + 5.4.1, 4.3.1.2  |
|      |   |                                             | CS4     | + 3.5.1           |
|      |   |                                             | J3      | + 2473.5          |
| 1617 | 5 | degree of packing is implementation defined | CHOL    | -                 |
|      |   |                                             | IRONMAN | o [11B, 12C, 11F] |
|      |   |                                             | J73C    | -                 |
|      |   |                                             | J73I    | -                 |
|      |   |                                             | PASCAL  | + 6.2             |
|      |   |                                             | PLI     | + 4.3.1           |
|      |   |                                             | CS4     | +                 |
|      |   |                                             | J3      | -                 |
| 1618 | 4 | machine-dependent packing                   | CHOL    | +                 |
|      |   |                                             | IRONMAN | + 11A, 12C        |
|      |   |                                             | J73C    | +                 |
|      |   |                                             | J73I    | + 2.1.5.7         |
|      |   |                                             | PASCAL  | -                 |
|      |   |                                             | PLI     | -                 |
|      |   |                                             | CS4     | + 8.1             |
|      |   |                                             | J3      | + 2474-5          |
| 1619 | 5 | separated from logical structure            | CHOL    | o                 |
|      |   |                                             | IRONMAN | + 11A, 12C        |
|      |   |                                             | J73C    | -                 |
|      |   |                                             | J73I    | -                 |
|      |   |                                             | PASCAL  | n                 |
|      |   |                                             | PLI     | n                 |
|      |   |                                             | CS4     | + 8.1.1           |
|      |   |                                             | J3      | -                 |
| 1620 | 5 | overlying forbidden                         | CHOL    | -                 |
|      |   |                                             | IRONMAN | + 1B, 3-3H        |
|      |   |                                             | J73C    | -                 |
|      |   |                                             | J73I    | - 2.1.5.7.2       |
|      |   |                                             | PASCAL  | n                 |
|      |   |                                             | PLI     | n                 |
|      |   |                                             | CS4     | - 8.1.1           |
|      |   |                                             | J3      | - 2474-5          |

## Structure Data Type

### 1621 4 programmer-definable access and update

|         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | + 3-3A, 7A |
| J73C    | -          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | -          |
| J3      | -          |

### 1622 3 constants

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | o [3-3A] |
| J73C    | +        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | +        |
| J3      | -        |

### 1623 4 structure literals (list of element expressions)

|         |                                              |
|---------|----------------------------------------------|
| CHOL    | +                                            |
| IRONMAN | + 3-3C, 5E, 3-3J                             |
| J73C    | +                                            |
| J73I    | -                                            |
| PASCAL  | -                                            |
| PLI     | -                                            |
| CS4     | + 3.5.3.4                                    |
| J3      | - 2433.5-.6 (except 0 denotes all zero bits) |

### 1624 5 component names specified

|         |                      |
|---------|----------------------|
| CHOL    | o                    |
| IRONMAN | o [3-3C, 5E, 3-3J]   |
| J73C    | o                    |
| J73I    | n                    |
| PASCAL  | n                    |
| PLI     | n                    |
| CS4     | + 3.5.3.4 (required) |
| J3      | n                    |

### 1625 4 mnemonic names can be specified

|         |       |
|---------|-------|
| CHOL    | +     |
| IRONMAN | + 5A  |
| J73C    | +     |
| J73I    | -     |
| PASCAL  | - 5   |
| PLI     | -     |
| CS4     | + 2.3 |
| J3      | -     |



## Structure Data Type

- 1636 4    **init.** attribute specified separately with each field in declaration
- |         |            |
|---------|------------|
| CHOL    | -          |
| IRONMAN | o 3-3C, 5E |
| J73C    | +          |
| J73I    | +          |
| PASCAL  | -          |
| PLI     | + 5.4.25   |
| CS4     | -          |
| J3      | +          |
- 
- 1637 4    **structure** valued expression specified, used directly
- |         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | + 3-3F, 3-3C, 5E |
| J73C    | +                |
| J73I    | -                |
| PASCAL  | -                |
| PLI     | - 5.4.25         |
| CS4     | + 3.5.3.4        |
| J3      | -                |
- 
- 1638 3    **structures** passed as parameters
- |         |                      |
|---------|----------------------|
| CHOL    | +                    |
| IRONMAN | + 7G                 |
| J73C    | +                    |
| J73I    | + 2.2                |
| PASCAL  | + 10, 9.1.2, 11, 8.2 |
| PLI     | + 6.10               |
| CS4     | + 5.1.1              |
| J3      | + 2446, 2484         |
- 
- 1639 4    **exact** match required (structuring, component types, bounds, lengths)
- |         |                                  |
|---------|----------------------------------|
| CHOL    | +                                |
| IRONMAN | - 7H, 3-3H, 7G                   |
| J73C    | +                                |
| J73I    | + 2.2.3.2 (but not enforced)     |
| PASCAL  | ?                                |
| PLI     | - 6.10.1, 6.10.2                 |
| CS4     | + 5.1.1.1 (REF, NAME parameters) |
| J3      | + 2446.7                         |
- 
- 1640 4    **actual** bounds/lengths used for formal bounds/lengths
- |         |                       |
|---------|-----------------------|
| CHOL    | +                     |
| IRONMAN | + 7H, 7G              |
| J73C    | +                     |
| J73I    | -                     |
| PASCAL  | - 10, 9.1.2           |
| PLI     | + 6.10.3              |
| CS4     | + 3.5.1, 3.4.1, 3.6.1 |
| J3      | -                     |

## Structure Data Type

- 1641 4    safe match permitted
- CHOL       -
  - IRONMAN   o 7H, 3-3H, 7G, 3-3F
  - J73C       -
  - J73I       -
  - PASCAL     ?
  - PLI        - 6.10.1, 6.10.2
  - CS4        + 5.1.1.1 (COPY parameters)
  - J3         -
- 1642 4    packing conversions permitted
- CHOL       -
  - IRONMAN   + 11B
  - J73C       -
  - J73I       -
  - PASCAL     ?
  - PLI        + 6.10.1
  - CS4        -
  - J3         -
- 1643 4    implicit conversions permitted on components
- CHOL       -
  - IRONMAN   - 3B, 7G
  - J73C       -
  - J73I       - 2.2.3.2
  - PASCAL     ?
  - PLI        + 6.10.1, 6.10.2
  - CS4        + 5.1.1.1 (COPY parameters)
  - J3         - 2446.7
- 1644 4    component types must match
- CHOL       +
  - IRONMAN   + 3B, 7G
  - J73C       +
  - J73I       + 2.2.3.2
  - PASCAL     ?
  - PLI        - 6.10.1, 6.10.2, 7.1.2, 7.1.3
  - CS4        - 5.1.1.1, 3.5.3.2 (COPY parameters)
  - J3         + 2446.7
- 1645 4    component names must match
- CHOL       +
  - IRONMAN   + 3-3F, 7G
  - J73C       + (if RESTRICTED)
  - J73I       - 2.2.3.2
  - PASCAL     ?
  - PLI        - 6.10.1, 6.10.2, 5.4.17
  - CS4        + 5.1.1.1, 3.5.3.2
  - J3         ? 2446.7

## Structure Data Type

1646 4    structuring must match

|         |                                      |
|---------|--------------------------------------|
| CHOL    | +                                    |
| IRONMAN | + 3-3F, 7G                           |
| J73C    | +                                    |
| J73I    | + 2.2.3.2                            |
| PASCAL  | ?                                    |
| PLI     | + 6.10.1, 6.10.2, 7.1.2, 7.1.3       |
| CS4     | + 5.1.1.1, 3.5.3.2 (COPY parameters) |
| J3      | + 2446.7                             |

1647 4    same rules as in assignment statements

|         |                                                        |
|---------|--------------------------------------------------------|
| CHOL    | +                                                      |
| IRONMAN | + 1E, 7G, 3-3F                                         |
| J73C    | +                                                      |
| J73I    | n (only tables and blocks, not entries, can be passed) |
| PASCAL  | ?                                                      |
| PLI     | + 6.10.1, 6.10.2, 12.2                                 |
| CS4     | + 5.1.1.1 (COPY parameters)                            |
| J3      | n (only tables, not entries, can be passed)            |

1648 4    pass substructure as actual parameter

|         |                           |
|---------|---------------------------|
| CHOL    | +                         |
| IRONMAN | + 3-3H, 3-3F              |
| J73C    | +                         |
| J73I    | + 2.2.3.2, 2.1.6 (blocks) |
| PASCAL  | + 7.2.2, 9.1.2, 10        |
| PLI     | + 6.10.1, 6.10.2, 6.4     |
| CS4     | + 3.5.3.1, 5.1.1          |
| J3      | n                         |

1649 4    pass scalar to a structure parameter

|         |                       |
|---------|-----------------------|
| CHOL    | -                     |
| IRONMAN | - 3-3F                |
| J73C    | -                     |
| J73I    | -                     |
| PASCAL  | -                     |
| PLI     | + 6.10.1, 6.10.2, 9.3 |
| CS4     | -                     |
| J3      | -                     |

1650 3    returnable as function values

|         |                      |
|---------|----------------------|
| CHOL    | -                    |
| IRONMAN | + 7D, 12D            |
| J73C    | -                    |
| J73I    | - 2.2.2              |
| PASCAL  | - 11                 |
| PLI     | + 12.21, 5.4.47, 6.7 |
| CS4     | + 5.1                |
| J3      | - 2485.3             |

# Structure Data Type

1651 4 efficiently

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | + 7D, 1D |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | ?        |
| CS4     | ?        |
| J3      | n        |

1652 3 structures accessed only by pointer across procedures

|         |        |
|---------|--------|
| CHOL    | +      |
| IRONMAN | - 3-3H |
| J73C    | +      |
| J73I    | -      |
| PASCAL  | +      |
| PLI     | -      |
| CS4     | -      |
| J3      | n      |

1653 4 actual parameters

|         |                  |
|---------|------------------|
| CHOL    | -                |
| IRONMAN | n                |
| J73C    | -                |
| J73I    | - 2.2.3.2        |
| PASCAL  | - 9.1.2, 10      |
| PLI     | - 6.10.1, 6.10.2 |
| CS4     | - 5.1.1          |
| J3      | n                |

1654 4 function values

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | n        |
| J73C    | +        |
| J73I    | n        |
| PASCAL  | + 11     |
| PLI     | - 5.4.47 |
| CS4     | - 5.1.1  |
| J3      | n        |

1655 3 component selection

|         |                |
|---------|----------------|
| CHOL    | +              |
| IRONMAN | + 3-3C         |
| J73C    | +              |
| J73I    | + 4.11         |
| PASCAL  | + 7.2.2        |
| PLI     | + 6.4, 6.5     |
| CS4     | + 3.5.3.1      |
| J3      | + 2424, 2471-6 |

## Structure Data Type

### 1656 4 qualified names...

CHOL +  
IRONMAN . 3-3C  
J73C +  
J73I -  
PASCAL + 7.2.2  
PLI +  
CS4 + 3.5.3.1  
J3 -

### 1657 5 complete qualification required

CHOL +  
IRONMAN o [3-3C]  
J73C -  
J73I -  
PASCAL + 7.2.2  
PLI -  
CS4 + 3.5.3.1  
J3 -

### 1658 5 partial qualification permitted

CHOL -  
IRONMAN o [3-3C]  
J73C +  
J73I -  
PASCAL - 7.2.2  
PLI + 6.4, 6.5  
CS4 - 3.5.3.1  
J3 -

### 1659 5 have at most two elements

CHOL -  
IRONMAN o [3-3C]  
J73C -  
J73I -  
PASCAL - 6.2.2, 7.2.2  
PLI -  
CS4 - 3.5.1, 3.5.3.1  
J3 -

### 1660 5 not supported, even with identical component names

CHOL -  
IRONMAN o [3-3C]  
J73C -  
J73I + (no identical component names)  
PASCAL -  
PLI -  
CS4 -  
J3 + (no identical component names)



## Structure Data Type

- 1661 4    nested arrays
- |         |                                   |
|---------|-----------------------------------|
| CHOL    | +                                 |
| IRONMAN | + 3-3B                            |
| J73C    | +                                 |
| J73I    | + 2.1.6 (in blocks only)          |
| PASCAL  | + 6.2.2                           |
| PLI     | + 6.4                             |
| CS4     | + 3.5.1                           |
| J3      | + 2474.2 (string-items in tables) |
- 1662 5    subscripts can be collected
- |         |                    |
|---------|--------------------|
| CHOL    | o                  |
| IRONMAN | o [3-3B]           |
| J73C    | -                  |
| J73I    | -                  |
| PASCAL  | - 7.2.1, 7.2.2     |
| PLI     | + 6.4              |
| CS4     | - 3.5.3.1, 3.4.3.1 |
| J3      | -                  |
- 1663 5    subscripts must be collected
- |         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | o [3-3B] |
| J73C    | +        |
| J73I    | + 4.11   |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | -        |
| J3      | + 2474.2 |
- 1664 4    substructures may be selected
- |         |                                |
|---------|--------------------------------|
| CHOL    | +                              |
| IRONMAN | + 3-3C                         |
| J73C    | +                              |
| J73I    | + 2.1.6, 4.11 (of blocks only) |
| PASCAL  | + 7.2.2                        |
| PLI     | + 6.4                          |
| CS4     | + 3.5.3.1                      |
| J3      | n                              |
- 1665 5    substructures permitted wherever structures permitted
- |         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | + 3-3C, 3-3B, 7F |
| J73C    | +                |
| J73I    | +                |
| PASCAL  | + 7.2.2          |
| PLI     | + 6.4            |
| CS4     | + 3.5.3.1        |
| J3      | n                |

## Structure Data Type

- 1666 6      as sources
- |         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | + 3-3C, 3-3B, 7F |
| J73C    | +                |
| J73I    | +                |
| PASCAL  | + 7.2.2          |
| PLI     | + 6.4            |
| CS4     | + 3.5.3.1        |
| J3      | n                |
- 1667 6      as targets
- |         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | + 3-3C, 3-3B, 7F |
| J73C    | +                |
| J73I    | +                |
| PASCAL  | + 7.2.2          |
| PLI     | + 6.4            |
| CS4     | + 3.5.3.1        |
| J3      | n                |
- 1668 4      multiple selection of an array of fields from an array of structures
- |         |                    |
|---------|--------------------|
| CHOL    | -                  |
| IRONMAN | ? 3-3B, 3-3C, 3-3E |
| J73C    | -                  |
| J73I    | -                  |
| PASCAL  | - 7.2.1, 7.2.2     |
| PLI     | + 6.4              |
| CS4     | -                  |
| J3      | -                  |
- 1669 4      object selected from may be yielded by a structure valued expression
- |         |           |
|---------|-----------|
| CHOL    | -         |
| IRONMAN | + 3-3C    |
| J73C    | -         |
| J73I    | -         |
| PASCAL  | + 7.2.2   |
| PLI     | - 6.4     |
| CS4     | + 3.5.3.1 |
| J3      | -         |
- 1670 4      selection notation distinct from procedure invocation
- |         |                |
|---------|----------------|
| CHOL    | o (lean to -)  |
| IRONMAN | o [3-3C]       |
| J73C    | o (lean to -)  |
| J73I    | n              |
| PASCAL  | + 7.2.2, 9.1.2 |
| PLI     | + 6.4, 6.7     |
| CS4     | + 3.5.3.1, 5.2 |
| J3      | n              |

## Structure Data Type

|      |   |                                                      |                                   |
|------|---|------------------------------------------------------|-----------------------------------|
| 1671 | 4 | WITH blocks                                          |                                   |
|      |   | CHOL                                                 | -                                 |
|      |   | IRONMAN                                              | o [3-3C]                          |
|      |   | J73C                                                 | -                                 |
|      |   | J73I                                                 | -                                 |
|      |   | PASCAL                                               | + 9.2.4                           |
|      |   | PLI                                                  | -                                 |
|      |   | CS4                                                  | -                                 |
|      |   | J3                                                   | -                                 |
| 1672 | 3 | structures of character strings as a scalar string   |                                   |
|      |   | CHOL                                                 | +                                 |
|      |   | IRONMAN                                              | - 3-3C                            |
|      |   | J73C                                                 | + (also via overlays)             |
|      |   | J73I                                                 | + 2.1.5.7 (via overlays)          |
|      |   | PASCAL                                               | -                                 |
|      |   | PLI                                                  | + 13.1.15, 12.2, 4.3.3.6          |
|      |   | CS4                                                  | -                                 |
|      |   | J3                                                   | + 2472.5-.10, 2474 (via overlays) |
| 1673 | 3 | structures of bit strings treated as a scalar string |                                   |
|      |   | CHOL                                                 | +                                 |
|      |   | IRONMAN                                              | n                                 |
|      |   | J73C                                                 | + (also via overlays)             |
|      |   | J73I                                                 | + 2.1.5.7 (via overlays)          |
|      |   | PASCAL                                               | n                                 |
|      |   | PLI                                                  | + 13.1.15, 12.2, 4.3.3.6          |
|      |   | CS4                                                  | n                                 |
|      |   | J3                                                   | n                                 |
| 1674 | 3 | SIZE function                                        |                                   |
|      |   | CHOL                                                 | +                                 |
|      |   | IRONMAN                                              | o 3-3C                            |
|      |   | J73C                                                 | +                                 |
|      |   | J73I                                                 | + 4.10.10                         |
|      |   | PASCAL                                               | -                                 |
|      |   | PLI                                                  | + 13.6.16                         |
|      |   | CS4                                                  | -                                 |
|      |   | J3                                                   | -                                 |
| 1675 | 3 | component-wise scalar operations                     |                                   |
|      |   | CHOL                                                 | -                                 |
|      |   | IRONMAN                                              | - 3-3C, 7A                        |
|      |   | J73C                                                 | -                                 |
|      |   | J73I                                                 | -                                 |
|      |   | PASCAL                                               | -                                 |
|      |   | PLI                                                  | + 7.1.2, 7.1.3                    |
|      |   | CS4                                                  | -                                 |
|      |   | J3                                                   | -                                 |

## Structure Data Type

### 1676 4 arithmetic operations

|         |                |
|---------|----------------|
| CHOL    | n *            |
| IRONMAN | n * [3-3C, 7A] |
| J73C    | n *            |
| J73I    | -              |
| PASCAL  | -              |
| PLI     | + 7.3.1        |
| CS4     | -              |
| J3      | -              |

### 1677 4 relational operations

|         |                |
|---------|----------------|
| CHOL    | n *            |
| IRONMAN | n * [3-3C, 7A] |
| J73C    | n *            |
| J73I    | -              |
| PASCAL  | -              |
| PLI     | + 7.3.4        |
| CS4     | -              |
| J3      | -              |

### 1678 4 implicit conversions

|         |                |
|---------|----------------|
| CHOL    | n *            |
| IRONMAN | n * 3B         |
| J73C    | n *            |
| J73I    | -              |
| PASCAL  | -              |
| PLI     | + 7.1.2, 7.1.3 |
| CS4     | -              |
| J3      | -              |

### 1679 4 explicit conversions

|         |                |
|---------|----------------|
| CHOL    | n *            |
| IRONMAN | n * [3-3C, 7A] |
| J73C    | n *            |
| J73I    | -              |
| PASCAL  | -              |
| PLI     | + 13.1, 13.2   |
| CS4     | -              |
| J3      | -              |

### 1680 4 exact match required (structuring, component names and types)

|         |                     |
|---------|---------------------|
| CHOL    | n                   |
| IRONMAN | n 3-3F              |
| J73C    | n                   |
| J73I    | n                   |
| PASCAL  | n                   |
| PLI     | - 7.1.2, 7.1.3, 9.3 |
| CS4     | n                   |
| J3      | n                   |

## Structure Data Type

### 1681 4 component types must match

|         |                     |
|---------|---------------------|
| CHOL    | n                   |
| IRONMAN | n * [3-3C, 7A]      |
| J73C    | n                   |
| J73I    | n                   |
| PASCAL  | n                   |
| PLI     | - 7.1.2, 7.1.3, 9.3 |
| CS4     | n                   |
| J3      | n                   |

### 1682 4 component names must match

|         |                     |
|---------|---------------------|
| CHOL    | n                   |
| IRONMAN | n * [3-3C, 7A]      |
| J73C    | n                   |
| J73I    | n                   |
| PASCAL  | n                   |
| PLI     | - 7.1.2, 7.1.3, 9.3 |
| CS4     | n                   |
| J3      | n                   |

### 1683 4 structuring must match

|         |                     |
|---------|---------------------|
| CHOL    | n                   |
| IRONMAN | n * [3-3C, 7A]      |
| J73C    | n                   |
| J73I    | n                   |
| PASCAL  | n                   |
| PLI     | + 7.1.2, 7.1.3, 9.3 |
| CS4     | n                   |
| J3      | n                   |

### 1684 3 relational operations

|         |                                  |
|---------|----------------------------------|
| CHOL    | +                                |
| IRONMAN | + 7A (i.e., by extension)        |
| J73C    | +                                |
| J73I    | + 4.11, 4.6 (table entries only) |
| PASCAL  | - 8.1.4                          |
| PLI     | -                                |
| CS4     | + 3.5.4.1                        |
| J3      | + 2437.1-.2, 2439.1              |



# Structure Data Type

- 1685 4 equality/inequality
- CHOL +
  - IRONMAN + 7A
  - J73C +
  - J73I + 4.6, 5.2.2, 4.11
  - PASCAL -
  - PLI -
  - CS4 + 3.5.4.1
  - J3 + 2437.1-.2, 2439.1 (pads shorter entry on left with zero bits)
- 1686 4 algebraic comparisons
- CHOL -
  - IRONMAN + 7A
  - J73C + (UNSPEC bit string, unless RESTRICTED)
  - J73I + 4.6, 5.2.2, 4.11
  - PASCAL -
  - PLI -
  - CS4 -
  - J3 -
- 1687 3 assignment
- CHOL +
  - IRONMAN + 3-3C, 3-3F, 5F
  - J73C +
  - J73I + 3.3, 4.11 (table entries only)
  - PASCAL + 9.1.1
  - PLI + 12.2
  - CS4 + 4.2, 3.5.3.2
  - J3 + 2442 (of entries, but not tables)
- 1688 4 exact match required on component types
- CHOL +
  - IRONMAN + 3-3F
  - J73C + (if RESTRICTED)
  - J73I -
  - PASCAL + 9.1.1
  - PLI - 12.2
  - CS4 - 3.5.3.2
  - J3 -

## Structure Data Type

- 1689 4    implicit conversion permitted on components
- CHOL       -
  - IRONMAN   - 3B
  - J73C       + (USPEC bit string, unless RESTRICTED)
  - J73I       + 4.11 (treated as UNSPEC bit string)
  - PASCAL     -
  - PLI        + 12.2
  - CS4        + 3.5.3.2 (precision)
  - J3         + 2442.6 (truncate/pad on left with zero bits)
- 1690 4    same conversions as in scalar assignments
- CHOL       + (i.e., none)
  - IRONMAN   + 3B, 3-3C, 3-3F (i.e., none, except for floating pt. accuracy and fixed pt. range (size))
  - J73C       + (i.e., none if RESTRICTED)
  - J73I       -
  - PASCAL     -
  - PLI        + 12.2
  - CS4        + 3.5.3.2 (precision)
  - J3         -
- 1691 4    packing conversions permitted
- CHOL       -
  - IRONMAN   + 11B
  - J73C       -
  - J73I       -
  - PASCAL     -
  - PLI        + 12.2
  - CS4        -
  - J3         -
- 1692 4    component names must match
- CHOL       +
  - IRONMAN   + 3-3F
  - J73C       + (if RESTRICTED)
  - J73I       -
  - PASCAL     + 9.1.1
  - PLI        - 12.2
  - CS4        + 3.5.3.2
  - J3         -

## Structure Data Type

- 1693 4 structuring must match
- CHOL +
  - IRONMAN - 3-3F
  - J73C + (if RESTRICTED)
  - J73I - 3.3, 4.11
  - PASCAL + 9.1.1
  - PLI + 12.2, 9.3
  - CS4 + 3.5.3.2
  - J3 - 2442.6
- 1694 4 BY NAME
- CHOL -
  - IRONMAN - 3-3F
  - J73C -
  - J73I -
  - PASCAL -
  - PLI - 12.2
  - CS4 -
  - J3 -
- 1695 4 scalar source assigned to each element of target structure
- CHOL -
  - IRONMAN - 3-3F, 3B
  - J73C -
  - J73I -
  - PASCAL -
  - PLI + 12.2, 9.3
  - CS4 -
  - J3 -
- 1696 3 expression evaluation...
- CHOL o [1.2.1]
  - IRONMAN . 3-3C
  - J73C o [1.2.1 (tables, blocks)]
  - J3 + 2430
- 1697 4 implicit conversion in evaluating operands
- CHOL -
  - IRONMAN o [3-3C]
  - J73C + (UNSPEC bit string, unless RESTRICTED)
  - J73I + 4.11 (treated as UNSPEC bit string)
  - PASCAL - 8
  - PLI + 7.1.2, 7.1.3
  - CS4 -
  - J3 + (truncate/pad on left with zero bits)

## Structure Data Type

- 1698 5 scalar expanded to structure
- |         |                     |
|---------|---------------------|
| CHOL    | n *                 |
| IRONMAN | - 3B                |
| J73C    | -                   |
| J73I    | -                   |
| PASCAL  | -                   |
| PLI     | + 7.1.2, 7.1.3, 9.3 |
| CS4     | -                   |
| J3      | -                   |
- 1699 5 packing conversions
- |         |                |
|---------|----------------|
| CHOL    | n *            |
| IRONMAN | + 11B          |
| J73C    | -              |
| J73I    | -              |
| PASCAL  | -              |
| PLI     | + 7.1.2, 7.1.3 |
| CS4     | -              |
| J3      | -              |
- 1700 4 evaluation order of operands...
- |         |                            |
|---------|----------------------------|
| CHOL    | o [1.2.1]                  |
| IRONMAN | o [3-3C]                   |
| J73C    | o [1.2.1 (tables, blocks)] |
- 1701 5 strictly left-to-right
- |         |          |
|---------|----------|
| CHOL    | -        |
| IRONMAN | o [3-3C] |
| J73C    | -        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | + 3.0    |
| J3      | + 2431   |
- 1702 5 left-to-right within equal precedence
- |         |          |
|---------|----------|
| CHOL    | -        |
| IRONMAN | o [3-3C] |
| J73C    | -        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | -        |
| J3      | -        |

# Structure Data Type

1703 5 order not specified

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | o [3-3C] |
| J73C    | +        |
| J73I    | + 4.8.3  |
| PASCAL  | + 8      |
| PLI     | + 7.1.4  |
| CS4     | -        |
| J3      | -        |

1704 3 constant expression evaluation

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | o [3-3A] |
| J73C    | +        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | -        |
| J3      | -        |

1705 4 component selection

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | + 5A, 4E |
| J73C    | +        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | -        |
| J3      | -        |

1706 4 SIZE

|         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | o 3-3C, 4E |
| J73C    | +          |
| J73I    | -          |
| PASCAL  | n          |
| PLI     | -          |
| CS4     | n          |
| J3      | n          |

1707 4 component-wise scalar operations

|         |   |
|---------|---|
| CHOL    | n |
| IRONMAN | n |
| J73C    | n |
| J73I    | n |
| PASCAL  | n |
| PLI     | - |
| CS4     | n |
| J3      | n |



## Structure Data Type

### 1708 4 relational operations

|         |   |
|---------|---|
| CHOL    | + |
| IRONMAN | n |
| J73C    | + |
| J73I    | - |
| PASCAL  | n |
| PLI     | n |
| CS4     | - |
| J3      | - |

### 1709 4 access read-only initialized structure

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | + 5A, 4E |
| J73C    | +        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | -        |
| J3      | n        |

### 1710 3 explicit conversions

|         |   |
|---------|---|
| CHOL    | - |
| IRONMAN | n |
| J73C    | - |
| J73I    | - |
| PASCAL  | - |
| PLI     | - |
| CS4     | - |
| J3      | - |

### 1711 4 scalar expanded to structure

|         |     |
|---------|-----|
| CHOL    | n * |
| IRONMAN | n   |
| J73C    | n * |
| J73I    | -   |
| PASCAL  | -   |
| PLI     | -   |
| CS4     | -   |
| J3      | -   |

### 1712 4 packing conversions

|         |     |
|---------|-----|
| CHOL    | n * |
| IRONMAN | n   |
| J73C    | n * |
| J73I    | -   |
| PASCAL  | -   |
| PLI     | -   |
| CS4     | -   |
| J3      | -   |

## Structure Data Type

1713 3 exception conditions

|         |   |
|---------|---|
| CHOL    | - |
| IRONMAN | n |
| J73C    | - |
| J73I    | - |
| PASCAL  | - |
| PLI     | - |
| CS4     | - |
| J3      | - |

## Union Data Type (or Overlays)

### 1714 2 Union Data Type (or Overlays)

CHOL + (variant structures)  
IRONMAN + 3-3H (variant structures)  
J73C + (variant structures, overlays)  
J73I + 1.5 (overlays)  
PASCAL + 6.2.2 (variant structures)  
PLI + 4.3.3 (string overlay defining)  
CS4 + 3.7 (union type)  
J3 + 2465 (overlays)

### 1715 3 mechanism...

CHOL o [(variant structures)]  
IRONMAN o [3-3H (variant structures)]  
J73C o [(variant structures, overlays)]

### 1716 4 union type is distinct from other types

CHOL -  
IRONMAN - 3-3H  
J73C -  
J73I -  
PASCAL -  
PLI -  
CS4 + 3.7.1  
J3 -

### 1717 4 accomplished by explicit overlay defining or equivalencing

CHOL + (By use of escape hatch)  
IRONMAN - 3-3H  
J73C +  
J73I + 1.5  
PASCAL -  
PLI + 4.3.3.6  
CS4 -  
J3 + 2465

### 1718 4 accomplished by implicit overlay defining or equivalencing

CHOL -  
IRONMAN o [3-3H (variant structures)]  
J73C -  
J73I -  
PASCAL -  
PLI -  
CS4 -  
J3 -

### Union Data Type (or Overlays)

1719 4 accomplished by (untyped) pointers and template (based) variables

|         |           |
|---------|-----------|
| CHOL    | -         |
| IRONMAN | - 3-3H    |
| J73C    | +         |
| J73I    | + 1.4     |
| PASCAL  | -         |
| PLI     | + 4.3.3.2 |
| CS4     | -         |
| J3      | -         |

1720 4 accomplished by variant structures

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | + 3-3H  |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | + 6.2.2 |
| PLI     | -       |
| CS4     | -       |
| J3      | -       |

1721 4 accomplished by specifying structure field offsets

|         |                 |
|---------|-----------------|
| CHOL    | +               |
| IRONMAN | - 11A, 3-3H, 1B |
| J73C    | +               |
| J73I    | + 2.1.5.7       |
| PASCAL  | -               |
| PLI     | -               |
| CS4     | + 8.1           |
| J3      | + 2474-5        |

1722 3 component types may be...

|         |                                                |
|---------|------------------------------------------------|
| CHOL    | (variant field types)                          |
| IRONMAN | o [3-3H (variant structures)]                  |
| J73C    | (variant field types, overlaid variable types) |
| J73I    | (overlaid variable types)                      |
| PASCAL  | (variant field types)                          |
| PLI     | (overlaid variable types)                      |
| CS4     | (union component types)                        |
| J3      | (overlaid variable types)                      |

1723 4 any scalar type

|         |                                           |
|---------|-------------------------------------------|
| CHOL    | +                                         |
| IRONMAN | + 3-3B                                    |
| J73C    | +                                         |
| J73I    | + 1.5, 2.1                                |
| PASCAL  | + 6.2.2                                   |
| PLI     | - 4.3.3.6 (only bit and character string) |
| CS4     | + 3.7.1                                   |
| J3      | + 2465.1                                  |

# Union Data Type (or Overlays)

|      |   |                       |                                               |
|------|---|-----------------------|-----------------------------------------------|
| 1724 | 4 | array type            |                                               |
|      |   | CHOL                  | +                                             |
|      |   | IRONMAN               | + 3-3B                                        |
|      |   | J73C                  | +                                             |
|      |   | J73I                  | + 1.5, 2.1                                    |
|      |   | PASCAL                | + 6.2.2                                       |
|      |   | PLI                   | + 4.3.3.6 (only bit and character components) |
|      |   | CS4                   | + 3.7.1                                       |
|      |   | J3                    | + 2465.1                                      |
| 1725 | 4 | structure type        |                                               |
|      |   | CHOL                  | +                                             |
|      |   | IRONMAN               | + 3-3B                                        |
|      |   | J73C                  | +                                             |
|      |   | J73I                  | + 1.5, 2.1                                    |
|      |   | PASCAL                | + 6.2.2                                       |
|      |   | PLI                   | + 4.3.3.6 (only bit and character components) |
|      |   | CS4                   | + 3.7.1                                       |
|      |   | J3                    | + 2465.1                                      |
| 1726 | 4 | label type            |                                               |
|      |   | CHOL                  | -                                             |
|      |   | IRONMAN               | - 5D                                          |
|      |   | J73C                  | -                                             |
|      |   | J73I                  | -                                             |
|      |   | PASCAL                | -                                             |
|      |   | PLI                   | -                                             |
|      |   | CS4                   | -                                             |
|      |   | J3                    | -                                             |
| 1727 | 4 | procedure type        |                                               |
|      |   | CHOL                  | +                                             |
|      |   | IRONMAN               | - 5D                                          |
|      |   | J73C                  | +                                             |
|      |   | J73I                  | -                                             |
|      |   | PASCAL                | -                                             |
|      |   | PLI                   | -                                             |
|      |   | CS4                   | -                                             |
|      |   | J3                    | -                                             |
| 1728 | 4 | other non-union types |                                               |
|      |   | CHOL                  | + (Bit string, character string)              |
|      |   | IRONMAN               | + 3-3B                                        |
|      |   | J73C                  | + (bit string, character string)              |
|      |   | J73I                  | -                                             |
|      |   | PASCAL                | + 6.2.2 (set, file)                           |
|      |   | PLI                   | -                                             |
|      |   | CS4                   | + 3.7.1 (set, matrix, vector)                 |
|      |   | J3                    | + 2465.1 (dual, character string)             |



# Union Data Type (or Overlays)

- 1729 4    union type
- |         |              |
|---------|--------------|
| CHOL    | +            |
| IRONMAN | + 3-3B, 3-3H |
| J73C    | +            |
| J73I    | + 1.5        |
| PASCAL  | + 6.2.2      |
| PLI     | - 4.3.3.3    |
| CS4     | + 3.7.1      |
| J3      | + 2465       |
- 1730 4    any specifiab<sup>le</sup> type (of variables)
- |         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | + 3-3B     |
| J73C    | +          |
| J73I    | + 1.5, 2.1 |
| PASCAL  | + 6.2.2    |
| PLI     | -          |
| CS4     | + 3.7.1    |
| J3      | + 2465.1   |
- 1731 3    equivalence of union types...
- |         |                                       |
|---------|---------------------------------------|
| CHOL    | (order of variants)                   |
| IRONMAN | o {3-3H (variant structures)}         |
| J73C    | (order of variants or overlaid items) |
| J73I    | (order of overlaid items)             |
| PASCAL  | (order of variants)                   |
| PLI     | (order of DEFINED declarations)       |
| CS4     | (equivalence of union types)          |
| J3      | (order of overlaid items)             |
- 1732 4    permutations of component types are equivalent
- |         |              |
|---------|--------------|
| CHOL    | +            |
| IRONMAN | + 3-3H, 3-3B |
| J73C    | +            |
| J73I    | + 1.5        |
| PASCAL  | + 6.2.2      |
| PLI     | + 5          |
| CS4     | - 3.7.1      |
| J3      | + 2465.3     |
- 1733 4    union(a,union(b,c)) is equivalent to union(a,b,c), etc.
- |         |              |
|---------|--------------|
| CHOL    | -            |
| IRONMAN | - 3-3H, 3-3B |
| J73C    | + (overlays) |
| J73I    | + 1.5        |
| PASCAL  | - 6.2.2      |
| PLI     | n            |
| CS4     | - 3.7.1      |
| J3      | + 2465       |

# Union Data Type (or Overlays)

1734 4 union(a,b,a) is equivalent to union(a,b), etc.  
CHOL - (union(a,b,a) is illegal)  
IRONMAN n 3-3H, 3-3B (not possible for variant records)  
J73C + (overlays)  
J73I + 1.5  
PASCAL - 6.2.2 (union (a,b,a) is illegal)  
PLI n  
CS4 - 3.7.1  
J3 + 2465

1735 4 some combinations of component types are prohibited  
CHOL -  
IRONMAN - 3-3B, 3-3H, 3-3I  
J73C -  
J73I - 1.5  
PASCAL - 6.2.2  
PLI + 4.3.3.6  
CS4 - 3.7.1  
J3 - 2465

1736 3 representation...  
CHOL o [(variant structures)]  
IRONMAN o [3-3H (variant structures)]  
J73C (no tag field for overlays)  
J73I (no tag field)  
PLI (no tag field)  
J3 (no tag field)

1737 4 implicit tag field signifying current component type  
CHOL -  
IRONMAN - 3-3G  
J73C -  
J73I - 1.5  
PASCAL - 6.2.2  
PLI - 4.3.3.6  
CS4 + 3.7.1  
J3 - 2465

1738 4 explicit tag field signifying current component type  
CHOL +  
IRONMAN + 3-3G  
J73C + (variant structures)  
J73I - 1.5  
PASCAL + 6.2.2  
PLI - 4.3.3.6  
CS4 -  
J3 - 2465

# Union Data Type (or Overlays)

1739 4 tag storage position under programmer control

|         |                        |
|---------|------------------------|
| CHOL    | +                      |
| IRONMAN | + 11A, 12C             |
| J73C    | + (variant structures) |
| J73I    | n                      |
| PASCAL  | - 6.2.2 (partly)       |
| PLI     | n                      |
| CS4     | - 3.7.1                |
| J3      | n                      |

1740 4 tag need not be stored

|         |                        |
|---------|------------------------|
| CHOL    | +                      |
| IRONMAN | + 3-3G                 |
| J73C    | + (variant structures) |
| J73I    | n                      |
| PASCAL  | + 6.2.2                |
| PLI     | n                      |
| CS4     | - 3.7.1                |
| J3      | n                      |

1741 3 constants

|         |                               |
|---------|-------------------------------|
| CHOL    | +                             |
| IRONMAN | o [3-3H (variant structures)] |
| J73C    | + (variant structures)        |
| J73I    | -                             |
| PASCAL  | -                             |
| PLI     | -                             |
| CS4     | +                             |
| J3      | -                             |

1742 4 literals

|         |                         |
|---------|-------------------------|
| CHOL    | +                       |
| IRONMAN | + 4B , 3-3C, 3-3H, 3-3J |
| J73C    | + (variant structures)  |
| J73I    | -                       |
| PASCAL  | -                       |
| PLI     | -                       |
| CS4     | -                       |
| J3      | -                       |

1743 4 mnemonic names can be specified

|         |                        |
|---------|------------------------|
| CHOL    | +                      |
| IRONMAN | + 5A                   |
| J73C    | + (variant structures) |
| J73I    | -                      |
| PASCAL  | -                      |
| PLI     | -                      |
| CS4     | + 2.3                  |
| J3      | -                      |

Union Data Type (or Overlays)

1744 5     run-time values permitted

|         |        |
|---------|--------|
| CHOL    | +      |
| IRONMAN | o [5A] |
| J73C    | +      |
| J73I    | n      |
| PASCAL  | n      |
| PLI     | n      |
| CS4     | + 2.3  |
| J3      | n      |

1745 3     variables

|         |                         |
|---------|-------------------------|
| CHOL    | +                       |
| IRONMAN | + 5B                    |
| J73C    | +                       |
| J73I    | - 4.11                  |
| PASCAL  | + 7                     |
| PLI     | - 4.1.3, 5.4.54, 6, 5.5 |
| CS4     | + 2.3                   |
| J3      | - 2422                  |

1746 4     read-only access specifiable (in a subscope)

|         |        |
|---------|--------|
| CHOL    | +      |
| IRONMAN | o 3-5B |
| J73C    | +      |
| J73I    | n      |
| PASCAL  | -      |
| PLI     | n      |
| CS4     | -      |
| J3      | n      |

1747 4     NULL value specifiable

|         |        |
|---------|--------|
| CHOL    | -      |
| IRONMAN | o [5B] |
| J73C    | -      |
| J73I    | n      |
| PASCAL  | -      |
| PLI     | n      |
| CS4     | -      |
| J3      | n      |

1748 4     undefined value exists

|         |                  |
|---------|------------------|
| CHOL    | -                |
| IRONMAN | o [5B]           |
| J73C    | -                |
| J73I    | n                |
| PASCAL  | -                |
| PLI     | n                |
| CS4     | + 2.3.2, 3.7.3.4 |
| J3      | n                |

# Union Data Type (or Overlays)

1749 5 is specifiable

|         |        |
|---------|--------|
| CHOL    | n      |
| IRONMAN | o [5B] |
| J73C    | n      |
| J73I    | n      |
| PASCAL  | n      |
| PLI     | n      |
| CS4     | -      |
| J3      | n      |

1750 3 parameters

|         |                        |
|---------|------------------------|
| CHOL    | +                      |
| IRONMAN | + 7G                   |
| J73C    | + (variant structures) |
| J73I    | - 2.2                  |
| PASCAL  | + 10, 9.1.2, 11, 8.2   |
| PLI     | - 6.10                 |
| CS4     | + 5.1.1                |
| J3      | - 2446, 2484           |

1751 4 exact match required

|         |                                  |
|---------|----------------------------------|
| CHOL    | +                                |
| IRONMAN | - 7H, 3-3H                       |
| J73C    | + (variant structures)           |
| J73I    | n                                |
| PASCAL  | ?                                |
| PLI     | n                                |
| CS4     | + 5.1.1.1 (REF, NAME parameters) |
| J3      | n                                |

1752 4 safe match required

|         |            |
|---------|------------|
| CHOL    | -          |
| IRONMAN | + 7H, 3-3H |
| J73C    | -          |
| J73I    | n          |
| PASCAL  | ?          |
| PLI     | n          |
| CS4     | ?          |
| J3      | n          |

1753 4 same rules as for the parameter's component types

|         |                        |
|---------|------------------------|
| CHOL    | +                      |
| IRONMAN | + 7G, 7H               |
| J73C    | + (variant structures) |
| J73I    | n                      |
| PASCAL  | ?                      |
| PLI     | n                      |
| CS4     | ?                      |
| J3      | n                      |



# Union Data Type (or Overlays)

1754 4 implicit conversion from component type to union type

|         |        |
|---------|--------|
| CHOL    | -      |
| IRONMAN | + 3-3H |
| J73C    | -      |
| J73I    | n      |
| PASCAL  | -      |
| PLI     | n      |
| CS4     | -      |
| J3      | n      |

1755 4 same rules as in assignment

|         |                             |
|---------|-----------------------------|
| CHOL    | +                           |
| IRONMAN | + 3-3H, 3-3F, 3B            |
| J73C    | + (variant structures)      |
| J73I    | n                           |
| PASCAL  | ?                           |
| PLI     | n                           |
| CS4     | + 5.1.1.1 (COPY parameters) |
| J3      | n                           |

1756 3 function values

|         |                      |
|---------|----------------------|
| CHOL    | -                    |
| IRONMAN | + 7D, 12D            |
| J73C    | -                    |
| J73I    | - 2.2.2              |
| PASCAL  | - 11                 |
| PLI     | - 12.21, 5.4.47, 6.7 |
| CS4     | + 5.1                |
| J3      | - 2432, 2485         |

1757 3 current type function

|         |                          |
|---------|--------------------------|
| CHOL    | +                        |
| IRONMAN | + 3-3C                   |
| J73C    | + (variant structures)   |
| J73I    | -                        |
| PASCAL  | + 7.2.2 (tag field name) |
| PLI     | -                        |
| CS4     | + 3.7.2                  |
| J3      | -                        |

1758 3 access to current component value

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | + 3-3C    |
| J73C    | +         |
| CS4     | + 3.7.3.1 |

# Union Data Type (or Overlays)

|      |   |                                                   |                        |
|------|---|---------------------------------------------------|------------------------|
| 1759 | 4 | safe                                              |                        |
|      |   | CHOL                                              | +                      |
|      |   | IRONMAN                                           | + 3-3F, 1B, 6C         |
|      |   | J73C                                              | + (variant structures) |
|      |   | J73I                                              | -                      |
|      |   | PASCAL                                            | -                      |
|      |   | PLI                                               | -                      |
|      |   | CS4                                               | + 3.7.3.1              |
|      |   | J3                                                | -                      |
| 1760 | 5 | minimal run-time overhead                         |                        |
|      |   | CHOL                                              | +                      |
|      |   | IRONMAN                                           | o [3-3F, 1B, 6C]       |
|      |   | J73C                                              | +                      |
|      |   | J73I                                              | n                      |
|      |   | PASCAL                                            | n                      |
|      |   | PLI                                               | n                      |
|      |   | CS4                                               | ?                      |
|      |   | J3                                                | n                      |
| 1761 | 6 | for type discrimination and checking              |                        |
|      |   | CHOL                                              | +                      |
|      |   | IRONMAN                                           | o [3-3F, 1B, 6C]       |
|      |   | J73C                                              | +                      |
|      |   | J73I                                              | n                      |
|      |   | PASCAL                                            | n                      |
|      |   | PLI                                               | n                      |
|      |   | CS4                                               | ? 3.7.3.1              |
|      |   | J3                                                | n                      |
| 1762 | 6 | for accessing component value                     |                        |
|      |   | CHOL                                              | +                      |
|      |   | IRONMAN                                           | o [3-3F, 1B, 6C]       |
|      |   | J73C                                              | +                      |
|      |   | J73I                                              | n                      |
|      |   | PASCAL                                            | n                      |
|      |   | PLI                                               | n                      |
|      |   | CS4                                               | + 3.7.3.1              |
|      |   | J3                                                | n                      |
| 1763 | 5 | case clause with component types for case indices |                        |
|      |   | CHOL                                              | +                      |
|      |   | IRONMAN                                           | o [3-3F, 1B, 6C]       |
|      |   | J73C                                              | + (variant structures) |
|      |   | J73I                                              | -                      |
|      |   | PASCAL                                            | -                      |
|      |   | PLI                                               | -                      |
|      |   | CS4                                               | -                      |
|      |   | J3                                                | -                      |

# Union Data Type (or Overlays)

|      |   |                       |                                        |
|------|---|-----------------------|----------------------------------------|
| 1764 | 4 | unsafe                |                                        |
|      |   | CHOL                  | -                                      |
|      |   | IRONMAN               | - 3-3F, 1B                             |
|      |   | J73C                  | + (overlays)                           |
|      |   | J73I                  | + 1.5                                  |
|      |   | PASCAL                | + 7.2.2                                |
|      |   | PLI                   | + 4.3.3.6                              |
|      |   | CS4                   | + 3.7.3.1, 7.3.2 (optional)            |
|      |   | J3                    | + 2465                                 |
| 1765 | 3 | relational operations |                                        |
|      |   | CHOL                  | +                                      |
|      |   | IRONMAN               | + 7A (by extension)                    |
|      |   | J73C                  | + (variant structures)                 |
|      |   | J73I                  | -                                      |
|      |   | PASCAL                | - 8.1.4                                |
|      |   | PLI                   | -                                      |
|      |   | CS4                   | + 3.7.4.1                              |
|      |   | J3                    | -                                      |
| 1766 | 4 | equality/inequality   |                                        |
|      |   | CHOL                  | +                                      |
|      |   | IRONMAN               | + 7A                                   |
|      |   | J73C                  | + (variant structures)                 |
|      |   | J73I                  | -                                      |
|      |   | PASCAL                | -                                      |
|      |   | PLI                   | -                                      |
|      |   | CS4                   | + 3.7.4.1                              |
|      |   | J3                    | -                                      |
| 1767 | 3 | assignment            |                                        |
|      |   | CHOL                  | +                                      |
|      |   | IRONMAN               | + 3-3C, 3-3F, 3-3H, 5F                 |
|      |   | J73C                  | + (variant structures)                 |
|      |   | J73I                  | - 3.3                                  |
|      |   | PASCAL                | + 9.1.1                                |
|      |   | PLI                   | - 12.2                                 |
|      |   | CS4                   | + 4.2, 3.7.3.2                         |
|      |   | J3                    | - 2442                                 |
| 1768 | 4 | exact match required  |                                        |
|      |   | CHOL                  | +                                      |
|      |   | IRONMAN               | + 3-3F, 3-3H                           |
|      |   | J73C                  | + (variant structures)                 |
|      |   | J73I                  | n                                      |
|      |   | PASCAL                | + 9.1.1                                |
|      |   | PLI                   | n                                      |
|      |   | CS4                   | - 3.7.3.2 (component names must match) |
|      |   | J3                    | n                                      |

## Union Data Type (or Overlays)

1769 4     implicit conversion from subunion to larger inclusive union

|         |                   |
|---------|-------------------|
| CHOL    | -                 |
| IRONMAN | + 12D, 3-3F, 3-3H |
| J73C    | -                 |
| J73I    | n                 |
| PASCAL  | -                 |
| PLI     | n                 |
| CS4     | - 3.7.3.2         |
| J3      | n                 |

1770 4     implicit conversion from component type to union type

|         |                   |
|---------|-------------------|
| CHOL    | -                 |
| IRONMAN | + 12D, 3-3F, 3-3H |
| J73C    | -                 |
| J73I    | n                 |
| PASCAL  | -                 |
| PLI     | n                 |
| CS4     | - 3.7.3.2         |
| J3      | n                 |

1771 3     expression evaluation...

|         |                                    |
|---------|------------------------------------|
| CHOL    | o [(variant structures)]           |
| IRONMAN | o [3-3H (variant structures)]      |
| J73C    | o [(variant structures, overlays)] |
| J73I    | -                                  |
| PLI     | -                                  |
| J3      | - 2431                             |

1772 4     implicit conversion in evaluating operands

|         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | - 3B |
| J73C    | -    |
| J73I    | n    |
| PASCAL  | - 8  |
| PLI     | n    |
| CS4     | -    |
| J3      | n    |

1773 4     evaluation order of operands...

|         |                                    |
|---------|------------------------------------|
| CHOL    | o [(variant structures)]           |
| IRONMAN | o [3-3H (variant structures)]      |
| J73C    | o [(variant structures, overlays)] |
| J73I    | n                                  |
| PLI     | n                                  |
| J3      | n                                  |

# Union Data Type (or Overlays)

## 1774 5 strictly left-to-right

CHOL -  
 IRONMAN o [3-3H (variant structures)]  
 J73C -  
 J73I n  
 PASCAL -  
 PLI n  
 CS4 + 3.0  
 J3 n

## 1775 5 left-to-right within equal precedence

CHOL -  
 IRONMAN o [3-3H (variant structures)]  
 J73C -  
 J73I n  
 PASCAL -  
 PLI n  
 CS4 -  
 J3 n

## 1776 5 order not specified

CHOL +  
 IRONMAN o [3-3H (variant structures)]  
 J73C + (variant structures)  
 J73I n  
 PASCAL + 8  
 PLI n  
 CS4 -  
 J3 n

## 1777 3 constant expression evaluation

CHOL +  
 IRONMAN o [3-3H (variant structures)]  
 J73C + (variant structures)  
 J73I -  
 PASCAL -  
 PLI -  
 CS4 -  
 J3 -

## 1778 4 suppression of type check when component type known at compile time

CHOL +  
 IRONMAN o 4E  
 J73C + (variant structures)  
 J73I n  
 PASCAL n  
 PLI n  
 CS4 ?  
 J3 n



# Union Data Type (or Overlays)

- 1779 4 relational operations
- |         |                        |
|---------|------------------------|
| CHOL    | +                      |
| IRONMAN | - 7A (by extension)    |
| J73C    | + (variant structures) |
| J73I    | n                      |
| PASCAL  | n                      |
| PLI     | n                      |
| CS4     | -                      |
| J3      | n                      |
- 1780 3 explicit conversions
- |         |                               |
|---------|-------------------------------|
| CHOL    | -                             |
| IRONMAN | o [3-3H (variant structures)] |
| J73C    | -                             |
| J73I    | -                             |
| PASCAL  | -                             |
| PLI     | -                             |
| CS4     | +                             |
| J3      | -                             |
- 1781 4 from subunion to larger inclusive union
- |         |      |
|---------|------|
| CHOL    | n *  |
| IRONMAN | + 4B |
| J73C    | n *  |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |
- 1782 4 from component type to union type
- |         |           |
|---------|-----------|
| CHOL    | n *       |
| IRONMAN | + 4B      |
| J73C    | n *       |
| J73I    | -         |
| PASCAL  | -         |
| PLI     | -         |
| CS4     | + 3.7.4.2 |
| J3      | -         |
- 1783 3 exception conditions
- |         |                               |
|---------|-------------------------------|
| CHOL    | +                             |
| IRONMAN | o [3-3H (variant structures)] |
| J73C    | + (variant structures)        |
| J73I    | -                             |
| PASCAL  | -                             |
| PLI     | -                             |
| CS4     | +                             |
| J3      | -                             |

# Union Data Type (or Overlays)

1784 4 unsafe access attempted (type check)  
CHOL +  
IRONMAN o [3-3H (variant structures)]  
J73C + (variant structures)  
J73I -  
PASCAL -  
PLI -  
CS4 + 3.7.3.1  
J3 -

## Control Structures

### 1785 1 Control Structures

|         |     |
|---------|-----|
| CHOL    | + 2 |
| IRONMAN | o   |
| J73C    | + 2 |
| J73I    | +   |
| PASCAL  | +   |
| PLI     | +   |
| CS4     | + 4 |
| J3      | +   |

### 1786 2 assignment statements

|         |                                                |
|---------|------------------------------------------------|
| CHOL    | + 2.1.1                                        |
| IRONMAN | + 5F, 3-3C, 3-3E, 3-3F, 3-1C, 3-1H, 3-3H, 3-2B |
| J73C    | + 2.1.1                                        |
| J73I    | + 3.3                                          |
| PASCAL  | + 9.1.1                                        |
| PLI     | + 12.2                                         |
| CS4     | + 4.2                                          |
| J3      | + 2442                                         |

### 1787 3 yield values

|         |       |
|---------|-------|
| CHOL    | -     |
| IRONMAN | ? 4C  |
| J73C    | -     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | - 4.2 |
| J3      | -     |

### 1788 3 multiple targets permitted (single source)...

|         |                                                  |
|---------|--------------------------------------------------|
| CHOL    | o                                                |
| IRONMAN | o [5F, 3-3C, 3-3E, 3-3F, 3-1C, 3-1H, 3-3H, 3-2B] |
| J73C    | +                                                |
| J73I    | + 3.3                                            |
| PASCAL  | - 9.1.1                                          |
| PLI     | + 12.2                                           |
| CS4     | - 4.2                                            |
| J3      | -                                                |

### 1789 4 only if same rhs value can be assigned to all (same target types)

|         |                                                  |
|---------|--------------------------------------------------|
| CHOL    | + (Consequence of no type conversion)            |
| IRONMAN | o (note effect of fixed/float precision changes) |
| J73C    | + (if RESTRICTED)                                |
| J73I    | -                                                |
| PASCAL  | n                                                |
| PLI     | - 12.2                                           |
| CS4     | n                                                |
| J3      | n                                                |

## Control Structures

1790 4    only normal type conversion restrictions

|         |   |                                                           |
|---------|---|-----------------------------------------------------------|
| CHOL    | + | (i.e., none)                                              |
| IRONMAN | + | 3B (i.e., none, except for possible changes of precision) |
| J73C    | + |                                                           |
| J73I    | + | 3.3, 1.7                                                  |
| PASCAL  | n |                                                           |
| PLI     | + | 12.2                                                      |
| CS4     | n |                                                           |
| J3      | n |                                                           |

1791 3    parallel assignment...

|         |                                                  |
|---------|--------------------------------------------------|
| CHOL    | -                                                |
| IRONMAN | o [5F, 3-3C, 3-3E, 3-3F, 3-1C, 3-1H, 3-3H, 3-2B] |
| J73C    | -                                                |
| J73I    | -                                                |
| PASCAL  | -                                                |
| PLI     | -                                                |
| CS4     | -                                                |
| J3      | -                                                |

1792 4    true parallel assignment

|         |                                                              |
|---------|--------------------------------------------------------------|
| CHOL    | n *                                                          |
| IRONMAN | ? 3-3C, 7F, 1A (depending on how call by result is realized) |
| J73C    | n *                                                          |
| J73I    | -                                                            |
| PASCAL  | -                                                            |
| PLI     | -                                                            |
| CS4     | -                                                            |
| J3      | -                                                            |

1793 4    sequential assignment

|         |      |
|---------|------|
| CHOL    | n *  |
| IRONMAN | - 1A |
| J73C    | n *  |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |

## Control Structures

### 1794 2 block/compound clause

|         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | o          |
| J73C    | +          |
| J73I    | + 3.1, 3.2 |
| PASCAL  | + 9.2.1    |
| PLI     | + 2.2, 2.3 |
| CS4     | + 4.3      |
| J3      | + 2450     |

### 1795 3 block statement, local declarations permitted

|         |                   |
|---------|-------------------|
| CHOL    | -                 |
| IRONMAN | ? 6A              |
| J73C    | -                 |
| J73I    | - 1.3.3, 3.1, 3.2 |
| PASCAL  | -                 |
| PLI     | + 2.2, 3.3, 5.1   |
| CS4     | + 4.3             |
| J3      | - 2450, 2489      |

### 1796 3 block expression, local declarations permitted

|         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | - 4C |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |

### 1797 4 value is yielded by lexically last constituent

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n * [4C] |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | n        |
| J3      | n        |

### 1798 4 value is yielded by an exit constituent

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n * [4C] |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | n        |
| J3      | n        |



## Control Structures

1799 3    block statement and expression have same syntax

|         |              |
|---------|--------------|
| CHOL    | n            |
| IRONMAN | n 1E, 2D, 4C |
| J73C    | n            |
| J73I    | n            |
| PASCAL  | n            |
| PLI     | n            |
| CS4     | n            |
| J3      | n            |

1800 3    compound statement, no scope opened

|         |                                                                |
|---------|----------------------------------------------------------------|
| CHOL    | +                                                              |
| IRONMAN | - 6A, 2D (requirement for "distinguishing syntax")             |
| J73C    | +                                                              |
| J73I    | + 1.3.3, 3.1, 3.2 (declarations local to procedure or program) |
| PASCAL  | + 9.2.1                                                        |
| PLI     | + 2.3, 5.1                                                     |
| CS4     | -                                                              |
| J3      | + 2450, 2489 (declarations local to procedure or program)      |

1801 3    compound expression, no scope opened

|         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | - 4C |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |

1802 4    value is yielded by lexically last constituent

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n * [4C] |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | n        |
| J3      | n        |

## Control Structures

1803 4 value is yielded by an exit constituent

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n * [4C] |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | n        |
| J3      | n        |

1804 3 compound statement and expression have same syntax

|         |              |
|---------|--------------|
| CHOL    | n            |
| IRONMAN | n 1E, 2D, 4C |
| J73C    | n            |
| J73I    | n            |
| PASCAL  | n            |
| PLI     | n            |
| CS4     | n            |
| J3      | n            |

1805 3 block and compound clause have same delimiters

|         |            |
|---------|------------|
| CHOL    | n          |
| IRONMAN | o 2D       |
| J73C    | n          |
| J73I    | n          |
| PASCAL  | n          |
| PLI     | - 2.2, 2.3 |
| CS4     | n          |
| J3      | n          |

1806 3 multiple closure allowed

|         |       |
|---------|-------|
| CHOL    | -     |
| IRONMAN | - 2D  |
| J73C    | -     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | + 2.4 |
| CS4     | - 4.3 |
| J3      | -     |

1807 2 conditional clause

|         |         |
|---------|---------|
| CHOL    | + 2.2.2 |
| IRONMAN | + 6C    |
| J73C    | + 2.2.2 |
| J73I    | +       |
| PASCAL  | +       |
| PLI     | +       |
| CS4     | +       |
| J3      | +       |

## Control Structures

### 1808 3 IF-THEN-ELSE clause

|         |           |
|---------|-----------|
| CHOL    | + 2.2.2   |
| IRONMAN | + 6C      |
| J73C    | + 2.2.2   |
| J73I    | + 3.7     |
| PASCAL  | + 9.2.2.1 |
| PLI     | + 12.16   |
| CS4     | + 4.5     |
| J3      | + 2453-4  |

### 1809 4 nestable

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | + 6A      |
| J73C    | +         |
| J73I    | +         |
| PASCAL  | + 9.2.2.1 |
| PLI     | + 12.16   |
| CS4     | + 4.5     |
| J3      | +         |

### 1810 4 IF-THEN statement

|         |           |
|---------|-----------|
| CHOL    | + 2.2.2   |
| IRONMAN | - 6C      |
| J73C    | + 2.2.2   |
| J73I    | + 3.7     |
| PASCAL  | + 9.2.2.1 |
| PLI     | + 12.16   |
| CS4     | + 4.5     |
| J3      | + 2453    |

### 1811 4 IF-THEN-ELSE statement

|         |                          |
|---------|--------------------------|
| CHOL    | + 2.2.2                  |
| IRONMAN | + 6C                     |
| J73C    | + 2.2.2                  |
| J73I    | + 3.7                    |
| PASCAL  | + 9.2.2.1                |
| PLI     | + 12.16                  |
| CS4     | + 4.5                    |
| J3      | + 2454 (ELSE via ORIF 1) |

### 1812 4 IF-THEN-ELSE expression

|         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | - 4C |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |

## Control Structures

1813 5 arms restricted to same value type

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n * [4C] |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | n        |
| J3      | n        |

1814 5 arms may be of different value types

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n * [4C] |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | n        |
| J3      | n        |

1815 5 conversion rules same as elsewhere in language

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n * [4C] |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | n        |
| J3      | n        |

1816 5 permitted as target in assignment statement

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n * [4C] |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | n        |
| J3      | n        |

1817 4 IF-THEN-ELSE statement and expression have same syntax

|         |              |
|---------|--------------|
| CHOL    | n            |
| IRONMAN | n 1E, 2D, 4C |
| J73C    | n            |
| J73I    | n            |
| PASCAL  | n            |
| PLI     | n            |
| CS4     | n            |
| J3      | n            |

## Control Structures

- 1818 4     constant evaluation
- |         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | + 6C, 11D  |
| J73C    | +          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | - 7.1, 4.5 |
| J3      | -          |
- 1819 4     implicit scope of constituent's local declarations...
- |         |           |
|---------|-----------|
| CHOL    | o [2.2.2] |
| IRONMAN | .         |
| J73C    | o [2.2.2] |
- 1820 5     IF expression is an implicit block expression
- |         |          |
|---------|----------|
| CHOL    | -        |
| IRONMAN | n 6A, 4C |
| J73C    | -        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | -        |
| J3      | -        |
- 1821 5     THEN and ELSE clauses are implicit block clauses
- |         |                                |
|---------|--------------------------------|
| CHOL    | -                              |
| IRONMAN | + 6A (permitted, not required) |
| J73C    | -                              |
| J73I    | -                              |
| PASCAL  | -                              |
| PLI     | -                              |
| CS4     | + 4.5 (for labels only)        |
| J3      | -                              |
- 1822 6     THEN and ELSE clauses are internal to IF expression
- |         |      |
|---------|------|
| CHOL    | n *  |
| IRONMAN | o 6A |
| J73C    | n *  |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |
- 1823 4     lexical extent of IF-THEN-ELSE clause...
- |         |           |
|---------|-----------|
| CHOL    | o [2.2.2] |
| IRONMAN | .         |
| J73C    | o [2.2.2] |



## Control Structures

- 1824 5      defined by required terminator
- |         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | + 2D, 6A |
| J73C    | -        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | + 4.5    |
| J3      | + 2454.5 |
- 
- 1825 6      is distinctive
- |         |                                                |
|---------|------------------------------------------------|
| CHOL    | o                                              |
| IRONMAN | + 6A (requirement for "distinguishing syntax") |
| J73C    | n                                              |
| J73I    | n                                              |
| PASCAL  | n                                              |
| PLI     | n                                              |
| CS4     | + 4.5                                          |
| J3      | - 2454.5 (END)                                 |
- 
- 1826 6      elseif particle
- |         |                      |
|---------|----------------------|
| CHOL    | +                    |
| IRONMAN | o 2D, 1B, 1C, 1E, 6C |
| J73C    | n *                  |
| J73I    | -                    |
| PASCAL  | -                    |
| PLI     | -                    |
| CS4     | -                    |
| J3      | + 2454.2             |
- 
- 1827 6      thenif particle
- |         |                      |
|---------|----------------------|
| CHOL    | o                    |
| IRONMAN | o 2D, 1B, 1C, 1E, 6C |
| J73C    | n *                  |
| J73I    | -                    |
| PASCAL  | -                    |
| PLI     | -                    |
| CS4     | -                    |
| J3      | -                    |
- 
- 1828 5      defined by compound clause
- |         |                                                    |
|---------|----------------------------------------------------|
| CHOL    | o                                                  |
| IRONMAN | - 2D, 6A (requirement for "distinguishing syntax") |
| J73C    | +                                                  |
| J73I    | + 3.7                                              |
| PASCAL  | + 9.2.2.1                                          |
| PLI     | + 12.16                                            |
| CS4     | -                                                  |
| J3      | + 2453.1, 2454.3-.4                                |

## Control Structures

|      |   |                       |                       |
|------|---|-----------------------|-----------------------|
| 1829 | 3 | case clause           |                       |
|      |   | CHOL                  | + 2.2.3               |
|      |   | IRONMAN               | + 6C                  |
|      |   | J73C                  | + 2.2.3               |
|      |   | J73I                  | + 3.8                 |
|      |   | PASCAL                | + 9.2.2.2             |
|      |   | PLI                   | -                     |
|      |   | CS4                   | + 4.6                 |
|      |   | J3                    | + 2482 (item switch)  |
| 1830 | 4 | with index expression |                       |
|      |   | CHOL                  | +                     |
|      |   | IRONMAN               | + 6C                  |
|      |   | J73C                  | +                     |
|      |   | J73I                  | + 3.8                 |
|      |   | PASCAL                | + 9.2.2.2             |
|      |   | PLI                   | n                     |
|      |   | CS4                   | + 4.6                 |
|      |   | J3                    | + 2482                |
| 1831 | 5 | implicit indexing     |                       |
|      |   | CHOL                  | -                     |
|      |   | IRONMAN               | - 6C                  |
|      |   | J73C                  | + (unless RESTRICTED) |
|      |   | J73I                  | + 3.8                 |
|      |   | PASCAL                | -                     |
|      |   | PLI                   | n                     |
|      |   | CS4                   | -                     |
|      |   | J3                    | -                     |
| 1832 | 6 | required              |                       |
|      |   | CHOL                  | n *                   |
|      |   | IRONMAN               | n * [6C]              |
|      |   | J73C                  | -                     |
|      |   | J73I                  | -                     |
|      |   | PASCAL                | n                     |
|      |   | PLI                   | n                     |
|      |   | CS4                   | n                     |
|      |   | J3                    | n                     |
| 1833 | 6 | optional              |                       |
|      |   | CHOL                  | n *                   |
|      |   | IRONMAN               | n * [6C]              |
|      |   | J73C                  | +                     |
|      |   | J73I                  | + 3.8                 |
|      |   | PASCAL                | n                     |
|      |   | PLI                   | n                     |
|      |   | CS4                   | n                     |
|      |   | J3                    | n                     |

## Control Structures

|      |   |                                            |                       |
|------|---|--------------------------------------------|-----------------------|
| 1834 | 5 | explicit indexing                          |                       |
|      |   | CHOL                                       | +                     |
|      |   | IRONMAN                                    | + 6C                  |
|      |   | J73C                                       | +                     |
|      |   | J73I                                       | + 3.8                 |
|      |   | PASCAL                                     | + 9.2.2.2             |
|      |   | PLI                                        | n                     |
|      |   | CS4                                        | + 4.6                 |
|      |   | J3                                         | + 2482                |
| 1835 | 6 | required                                   |                       |
|      |   | CHOL                                       | +                     |
|      |   | IRONMAN                                    | + 6C                  |
|      |   | J73C                                       | + (if RESTRICTED)     |
|      |   | J73I                                       | -                     |
|      |   | PASCAL                                     | + 9.2.2.2             |
|      |   | PLI                                        | n                     |
|      |   | CS4                                        | + 4.6                 |
|      |   | J3                                         | +                     |
| 1836 | 6 | intermixed with implicit indexing          |                       |
|      |   | CHOL                                       | -                     |
|      |   | IRONMAN                                    | - 6C                  |
|      |   | J73C                                       | + (unless RESTRICTED) |
|      |   | J73I                                       | + 3.8                 |
|      |   | PASCAL                                     | -                     |
|      |   | PLI                                        | n                     |
|      |   | CS4                                        | -                     |
|      |   | J3                                         | -                     |
| 1837 | 6 | constituents may have several index values |                       |
|      |   | CHOL                                       | +                     |
|      |   | IRONMAN                                    | o [6C]                |
|      |   | J73C                                       | +                     |
|      |   | J73I                                       | + 3.8                 |
|      |   | PASCAL                                     | + 9.2.2.2             |
|      |   | PLI                                        | n                     |
|      |   | CS4                                        | + 4.6                 |
|      |   | J3                                         | + 2482.1, 2482.4      |
| 1838 | 6 | index ranges may be specified              |                       |
|      |   | CHOL                                       | +                     |
|      |   | IRONMAN                                    | o [6C]                |
|      |   | J73C                                       | +                     |
|      |   | J73I                                       | + 3.8                 |
|      |   | PASCAL                                     | -                     |
|      |   | PLI                                        | n                     |
|      |   | CS4                                        | -                     |
|      |   | J3                                         | -                     |

## Control Structures

1839 6      duplication of index values permitted

|         |                      |
|---------|----------------------|
| CHOL    | -                    |
| IRONMAN | ? 1A, 1B, 1D, 6G, 6C |
| J73C    | -                    |
| J73I    | - 3.8                |
| PASCAL  | -                    |
| PLI     | n                    |
| CS4     | - 4.6                |
| J3      | -                    |

1840 6      indices...

|         |        |
|---------|--------|
| CHOL    | o      |
| IRONMAN | o [6C] |
| J73C    | o      |
| PLI     | n      |

1841 7      must be compile-time constants

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | + 6C             |
| J73C    | +                |
| J73I    | + 3.8.1          |
| PASCAL  | + 9.2.2.2, 6.2.2 |
| PLI     | n                |
| CS4     | + 4.6            |
| J3      | + 2482.1         |

1842 7      may be run-time values

|         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | ? 6C |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | n    |
| CS4     | -    |
| J3      | -    |

1843 5      type of indices permitted...

|         |        |
|---------|--------|
| CHOL    | o      |
| IRONMAN | o [6C] |
| J73C    | o      |
| PLI     | n      |

# Control Structures

1844 6 integers  
 CHOL +  
 IRONMAN + 6C  
 J73C +  
 J73I + 3.8  
 PASCAL + 9.2.2.2, 4.D.2  
 PLI n  
 CS4 + 4.6  
 J3 + 2482

1845 6 fixed point reals  
 CHOL n  
 IRONMAN + 6C, 3-1E  
 J73C n  
 J73I n  
 PASCAL n  
 PLI n  
 CS4 -  
 J3 + 2482

1846 6 status values  
 CHOL +  
 IRONMAN + 6C  
 J73C +  
 J73I -  
 PASCAL + 9.2.2.2, 4.D.2  
 PLI n  
 CS4 + 4.6  
 J3 + 2482

1847 6 boolean values  
 CHOL +  
 IRONMAN + 6C, 3-2C  
 J73C +  
 J73I n  
 PASCAL + 9.2.2.2, 4.D.2  
 PLI n  
 CS4 -  
 J3 + 2482

1848 6 bit values  
 CHOL +  
 IRONMAN n  
 J73C +  
 J73I -  
 PASCAL n  
 PLI n  
 CS4 n  
 J3 n



## Control Structures

|        |                                        |                  |
|--------|----------------------------------------|------------------|
| 1849 6 | set values                             |                  |
|        | CHOL                                   | n                |
|        | IRONMAN                                | + 6C, 3-4A       |
|        | J73C                                   | n                |
|        | J73I                                   | n                |
|        | PASCAL                                 | -                |
|        | PLI                                    | n                |
|        | CS4                                    | -                |
|        | J3                                     | n                |
| 1850 6 | single character values                |                  |
|        | CHOL                                   | + (char(1))      |
|        | IRONMAN                                | + 6C, 3-2D       |
|        | J73C                                   | + (char(1))      |
|        | J73I                                   | n                |
|        | PASCAL                                 | + 9.2.2.2, 4.D.2 |
|        | PLI                                    | n                |
|        | CS4                                    | n                |
|        | J3                                     | n                |
| 1851 6 | character string values                |                  |
|        | CHOL                                   | +                |
|        | IRONMAN                                | o 6C, 2H         |
|        | J73C                                   | +                |
|        | J73I                                   | -                |
|        | PASCAL                                 | -                |
|        | PLI                                    | n                |
|        | CS4                                    | + 4.6            |
|        | J3                                     | + 2482           |
| 1852 6 | data type values                       |                  |
|        | CHOL                                   | +                |
|        | IRONMAN                                | + 6C, 3-3G       |
|        | J73C                                   | +                |
|        | J73I                                   | -                |
|        | PASCAL                                 | -                |
|        | PLI                                    | n                |
|        | CS4                                    | -                |
|        | J3                                     | -                |
| 1853 6 | all exactly representable scalar types |                  |
|        | CHOL                                   | +                |
|        | IRONMAN                                | + 6C             |
|        | J73C                                   | +                |
|        | J73I                                   | -                |
|        | PASCAL                                 | + 9.2.2.2, 4.D.2 |
|        | PLI                                    | n                |
|        | CS4                                    | -                |
|        | J3                                     | + 2482           |

## Control Structures

1854 4    explicit predicates...

|         |           |
|---------|-----------|
| CHOL    | o         |
| IRONMAN | o [6C]    |
| J73C    | o         |
| J73I    | -         |
| PASCAL  | - 9.2.2.2 |
| PLI     | n         |
| CS4     | - 4.6     |
| J3      | -         |

1855 5    all true predicates are selected

|         |      |
|---------|------|
| CHOL    | o    |
| IRONMAN | - 6C |
| J73C    | o    |
| J73I    | n    |
| PASCAL  | n    |
| PLI     | n    |
| CS4     | n    |
| J3      | n    |

1856 5    first true predicate is selected

|         |      |
|---------|------|
| CHOL    | o    |
| IRONMAN | o 6C |
| J73C    | o    |
| J73I    | n    |
| PASCAL  | n    |
| PLI     | n    |
| CS4     | n    |
| J3      | n    |

1857 4    implicit control flow into lexically following case constituent...

|         |           |
|---------|-----------|
| CHOL    | o [2.2.3] |
| IRONMAN | o [6C]    |
| J73C    | o [2.2.3] |

1858 5    prohibited

|         |                   |
|---------|-------------------|
| CHOL    | +                 |
| IRONMAN | + 6C              |
| J73C    | + (if RESTRICTED) |
| J73I    | -                 |
| PASCAL  | + 9.2.2.2         |
| PLI     | n                 |
| CS4     | + 4.6             |
| J3      | -                 |

## Control Structures

- 1859 5      programmer specifiable
- |         |                       |
|---------|-----------------------|
| CHOL    | -                     |
| IRONMAN | - 6C                  |
| J73C    | + (unless RESTRICTED) |
| J73I    | + 3.8                 |
| PASCAL  | -                     |
| PLI     | n                     |
| CS4     | -                     |
| J3      | + 2482                |
- 
- 1860 6      is the default
- |         |          |
|---------|----------|
| CHOL    | n        |
| IRONMAN | n * [6C] |
| J73C    | -        |
| J73I    | - 3.8    |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | n        |
| J3      | + 2482   |
- 
- 1861 5      required
- |         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | - 6C |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | n    |
| CS4     | -    |
| J3      | -    |
- 
- 1862 4      case constituent can be labelled
- |         |                                                                        |
|---------|------------------------------------------------------------------------|
| CHOL    | -                                                                      |
| IRONMAN | o 6C (branching from one constituent to another seems to be permitted) |
| J73C    | + (unless RESTRICTED)                                                  |
| J73I    | + 3.8.1                                                                |
| PASCAL  | + 9.2.2.2                                                              |
| PLI     | n                                                                      |
| CS4     | + 4.6                                                                  |
| J3      | + 2482                                                                 |

## Control Structures

1863 5 labels distinguished from index values

|         |            |
|---------|------------|
| CHOL    | n          |
| IRONMAN | + 1C, 6C   |
| J73C    | +          |
| J73I    | + 3.8.1    |
| PASCAL  | n          |
| PLI     | n          |
| CS4     | + 4.6, 4.0 |
| J3      | + 2482     |

1864 4 else constituents...

|         |           |
|---------|-----------|
| CHOL    | o [2.2.3] |
| IRONMAN | o [6C]    |
| J73C    | o [2.2.3] |
| PLI     | n         |
| J3      | - 2482    |

1865 5 permitted for indexed case clauses

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | + 6C      |
| J73C    | +         |
| J73I    | + 3.8     |
| PASCAL  | - 9.2.2.2 |
| PLI     | n         |
| CS4     | + 4.6     |
| J3      | -         |

1866 6 required

|         |      |
|---------|------|
| CHOL    | o    |
| IRONMAN | o 6C |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | n    |
| PLI     | n    |
| CS4     | -    |
| J3      | -    |

1867 6 required if range not covered

|         |                   |
|---------|-------------------|
| CHOL    | +                 |
| IRONMAN | + 6C              |
| J73C    | + (if RESTRICTED) |
| J73I    | -                 |
| PASCAL  | n                 |
| PLI     | n                 |
| CS4     | -                 |
| J3      | -                 |

## Control Structures

- 1868 6      effect undefined if range not covered
- |         |                       |
|---------|-----------------------|
| CHOL    | -                     |
| IRONMAN | - 6C                  |
| J73C    | + (unless RESTRICTED) |
| J73I    | + 3.8                 |
| PASCAL  | + 9.2.2.2, 4.D.2      |
| PLI     | n                     |
| CS4     | -                     |
| J3      | -                     |
- 
- 1869 6      exception condition if range not covered
- |         |       |
|---------|-------|
| CHOL    | -     |
| IRONMAN | n 6C  |
| J73C    | -     |
| J73I    | -     |
| PASCAL  | n     |
| PLI     | n     |
| CS4     | + 4.6 |
| J3      | -     |
- 
- 1870 6      null effect if range not covered (statements)
- |         |          |
|---------|----------|
| CHOL    | -        |
| IRONMAN | n 6C     |
| J73C    | -        |
| J73I    | -        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | -        |
| J3      | + 2482.4 |
- 
- 1871 6      default value if range not covered (expressions)
- |         |      |
|---------|------|
| CHOL    | n    |
| IRONMAN | n 6C |
| J73C    | n    |
| J73I    | n    |
| PASCAL  | n    |
| PLI     | n    |
| CS4     | n    |
| J3      | n    |
- 
- 1872 5      permitted for conditional case clauses
- |         |      |
|---------|------|
| CHOL    | o    |
| IRONMAN | o 6C |
| J73C    | o    |
| J73I    | n    |
| PASCAL  | n    |
| PLI     | n    |
| CS4     | n    |
| J3      | n    |



## Control Structures

### 1873 4 type of case constituents...

|         |           |
|---------|-----------|
| CHOL    | o [2.2.3] |
| IRONMAN | o [6C]    |
| J73C    | o [2.2.3] |
| PLI     | n         |

### 1874 5 case statements

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | + 6C      |
| J73C    | +         |
| J73I    | + 3.8     |
| PASCAL  | + 9.2.2.2 |
| PLI     | n         |
| CS4     | + 4.6     |
| J3      | + 2482    |

### 1875 5 case expressions

|         |          |
|---------|----------|
| CHOL    | -        |
| IRONMAN | - 4C, 6C |
| J73C    | -        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | n        |
| CS4     | -        |
| J3      | -        |

### 1876 6 mixed mode permitted

|         |              |
|---------|--------------|
| CHOL    | n *          |
| IRONMAN | n * [4C, 6C] |
| J73C    | n            |
| J73I    | n            |
| PASCAL  | n            |
| PLI     | n            |
| CS4     | n            |
| J3      | n            |

### 1877 6 mixed mode forbidden

|         |              |
|---------|--------------|
| CHOL    | n *          |
| IRONMAN | n * [4C, 6C] |
| J73C    | n            |
| J73I    | n            |
| PASCAL  | n            |
| PLI     | n            |
| CS4     | n            |
| J3      | n            |

## Control Structures

- 1878 6      conversion rules same as elsewhere in language
- |         |              |
|---------|--------------|
| CHOL    | n *          |
| IRONMAN | n * [4C, 6C] |
| J73C    | n            |
| J73I    | n            |
| PASCAL  | n            |
| PLI     | n            |
| CS4     | n            |
| J3      | n            |
- 1879 6      permitted as target in assignment statement
- |         |              |
|---------|--------------|
| CHOL    | n *          |
| IRONMAN | n * [4C, 6C] |
| J73C    | n            |
| J73I    | n            |
| PASCAL  | n            |
| PLI     | n            |
| CS4     | n            |
| J3      | n            |
- 1880 5      case statement and expression have same syntax
- |         |                  |
|---------|------------------|
| CHOL    | n                |
| IRONMAN | n 2D, 4C, 1E, 6C |
| J73C    | n                |
| J73I    | n                |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | n                |
- 1881 4      constant evaluation
- |         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | + 6C, 11D  |
| J73C    | +          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | n          |
| CS4     | - 7.1, 4.6 |
| J3      | -          |
- 1882 4      implicit scope of constituent's local declarations...
- |         |           |
|---------|-----------|
| CHOL    | o [2.2.3] |
| IRONMAN | + 6A      |
| J73C    | o [2.2.3] |
| PLI     | n         |

## Control Structures

1883 5 index expression is an implicit block expression

|         |          |
|---------|----------|
| CHOL    | -        |
| IRONMAN | n 6A, 4C |
| J73C    | -        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | n        |
| CS4     | -        |
| J3      | -        |

1884 5 case constituent clauses and ELSE clause are implicit block clauses

|         |                                |
|---------|--------------------------------|
| CHOL    | -                              |
| IRONMAN | o 6A (permitted, not required) |
| J73C    | -                              |
| J73I    | -                              |
| PASCAL  | -                              |
| PLI     | n                              |
| CS4     | + 4.6 (for labels only)        |
| J3      | -                              |

1885 6 case constit. clauses and ELSE clause internal to index expression

|         |      |
|---------|------|
| CHOL    | n *  |
| IRONMAN | o 6A |
| J73C    | n *  |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | n    |
| CS4     | -    |
| J3      | -    |

1886 4 lexical extent of case constituents...

|         |           |
|---------|-----------|
| CHOL    | o [2.2.3] |
| IRONMAN | o [6C]    |
| J73C    | o [2.2.3] |
| PLI     | n         |

1887 5 for implicit indexing...

|         |                       |
|---------|-----------------------|
| CHOL    | n                     |
| IRONMAN | o [6C]                |
| J73C    | + (unless RESTRICTED) |
| J73I    | + 3.8                 |
| PASCAL  | n                     |
| PLI     | n                     |
| CS4     | n                     |
| J3      | n                     |

## Control Structures

|      |   |                                        |
|------|---|----------------------------------------|
| 1888 | 6 | defined by required delimiter          |
|      |   | CHOL      n *                          |
|      |   | IRONMAN   n                            |
|      |   | J73C      + (unless RESTRICTED)        |
|      |   | J73I      + 3.8                        |
|      |   | PASCAL    n                            |
|      |   | PLI        n                           |
|      |   | CS4        n                           |
|      |   | J3         n                           |
| 1889 | 7 | is distinctive                         |
|      |   | CHOL      n *                          |
|      |   | IRONMAN   n                            |
|      |   | J73C      + (unless RESTRICTED)        |
|      |   | J73I      +                            |
|      |   | PASCAL    n                            |
|      |   | PLI        n                           |
|      |   | CS4        n                           |
|      |   | J3         n                           |
| 1890 | 6 | defined by compound clause             |
|      |   | CHOL      n *                          |
|      |   | IRONMAN   n                            |
|      |   | J73C      + (unless RESTRICTED)        |
|      |   | J73I      + 3.8                        |
|      |   | PASCAL    n                            |
|      |   | PLI        n                           |
|      |   | CS4        n                           |
|      |   | J3         n                           |
| 1891 | 5 | for explicit indexing or predicates... |
|      |   | CHOL      +                            |
|      |   | IRONMAN   o [6C]                       |
|      |   | J73C      +                            |
|      |   | J73I      + 3.8                        |
|      |   | PASCAL    + 9.2.2.2                    |
|      |   | PLI        n                           |
|      |   | CS4        + 4.6                       |
|      |   | J3         + 2482                      |
| 1892 | 6 | defined by required terminator         |
|      |   | CHOL      o                            |
|      |   | IRONMAN   + 2D, 6A, 6C                 |
|      |   | J73C      -                            |
|      |   | J73I      -                            |
|      |   | PASCAL    -                            |
|      |   | PLI        n                           |
|      |   | CS4        -                           |
|      |   | J3         -                           |

# Control Structures

|      |   |                                                   |            |
|------|---|---------------------------------------------------|------------|
| 1893 | 7 | is distinctive                                    |            |
|      |   | CHOL                                              | o          |
|      |   | IRONMAN                                           | + 6A, 6C   |
|      |   | J73C                                              | n          |
|      |   | J73I                                              | n          |
|      |   | PASCAL                                            | n          |
|      |   | PLI                                               | n          |
|      |   | CS4                                               | n          |
|      |   | J3                                                | n          |
| 1894 | 6 | defined implicitly by explicit index or predicate |            |
|      |   | CHOL                                              | o          |
|      |   | IRONMAN                                           | o 2D, 6A   |
|      |   | J73C                                              | +          |
|      |   | J73I                                              | + 3.8      |
|      |   | PASCAL                                            | -          |
|      |   | PLI                                               | n          |
|      |   | CS4                                               | + 4.6      |
|      |   | J3                                                | -          |
| 1895 | 7 | is distinctive                                    |            |
|      |   | CHOL                                              | o          |
|      |   | IRONMAN                                           | o [2D, 6A] |
|      |   | J73C                                              | +          |
|      |   | J73I                                              | + 3.8      |
|      |   | PASCAL                                            | n          |
|      |   | PLI                                               | n          |
|      |   | CS4                                               | + 4.6      |
|      |   | J3                                                | n          |
| 1896 | 6 | defined by compound clause                        |            |
|      |   | CHOL                                              | o          |
|      |   | IRONMAN                                           | - 2D, 6A   |
|      |   | J73C                                              | +          |
|      |   | J73I                                              | + 3.8      |
|      |   | PASCAL                                            | + 9.2.2.2  |
|      |   | PLI                                               | n          |
|      |   | CS4                                               | -          |
|      |   | J3                                                | -          |
| 1897 | 4 | lexical extent of case clause...                  |            |
|      |   | CHOL                                              | o [2.2.3]  |
|      |   | IRONMAN                                           | o [6C]     |
|      |   | J73C                                              | o [2.2.3]  |
|      |   | PLI                                               | n          |
|      |   | J3                                                | 2482       |



## Control Structures

1898 5 defined by required terminator

|         |              |
|---------|--------------|
| CHOL    | o            |
| IRONMAN | + 2D, 6A, 6C |
| J73C    | -            |
| J73I    | -            |
| PASCAL  | + 9.2.2.2    |
| PLI     | n            |
| CS4     | + 4.6        |
| J3      | -            |

1899 6 is distinctive

|         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | + 6A, 6C |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | -        |
| PLI     | n        |
| CS4     | -        |
| J3      | n        |

1900 5 defined by compound clause

|         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | - 2D, 6A |
| J73C    | +        |
| J73I    | + 3.8    |
| PASCAL  | -        |
| PLI     | n        |
| CS4     | -        |
| J3      | -        |

1901 2 iteration statements

|         |          |
|---------|----------|
| CHOL    | + 2.2.4  |
| IRONMAN | + 6E     |
| J73C    | + 2.2.4  |
| J73I    | + 3.9    |
| PASCAL  | + 9.2.3  |
| PLI     | + 12.9   |
| CS4     | + 4.7    |
| J3      | + 2455-8 |

1902 3 indefinite iteration (WHILE statement)...

|         |                    |
|---------|--------------------|
| CHOL    | +                  |
| IRONMAN | o [6E]             |
| J73C    | +                  |
| J73I    | + 3.9              |
| PASCAL  | + 9.2.3.1, 9.2.3.2 |
| PLI     | + 12.9             |
| CS4     | + 4.7              |
| J3      | + 2455.6, 2458.4   |

## Control Structures

|        |                                     |           |
|--------|-------------------------------------|-----------|
| 1903 4 | test at the beginning               |           |
|        | CHOL                                | +         |
|        | IRONMAN                             | + 6E      |
|        | J73C                                | +         |
|        | J73I                                | + 3.9.2   |
|        | PASCAL                              | + 9.2.3.1 |
|        | PLI                                 | + 12.9    |
|        | CS4                                 | + 4.7     |
|        | J3                                  | -         |
| 1904 4 | test at end                         |           |
|        | CHOL                                | +         |
|        | IRONMAN                             | + 6E      |
|        | J73C                                | +         |
|        | J73I                                | -         |
|        | PASCAL                              | + 9.2.3.2 |
|        | PLI                                 | -         |
|        | CS4                                 | -         |
|        | J3                                  | + 2455    |
| 1905 4 | test in the middle                  |           |
|        | CHOL                                | +         |
|        | IRONMAN                             | + 6E      |
|        | J73C                                | +         |
|        | J73I                                | -         |
|        | PASCAL                              | -         |
|        | PLI                                 | -         |
|        | CS4                                 | -         |
|        | J3                                  | -         |
| 1906 4 | all three forms supported uniformly |           |
|        | CHOL                                | o         |
|        | IRONMAN                             | + 6A      |
|        | J73C                                | o         |
|        | J73I                                | n         |
|        | PASCAL                              | n         |
|        | PLI                                 | n         |
|        | CS4                                 | n         |
|        | J3                                  | n         |
| 1907 4 | with a control variable             |           |
|        | CHOL                                | +         |
|        | IRONMAN                             | + 6F      |
|        | J73C                                | +         |
|        | J73I                                | + 3.9     |
|        | PASCAL                              | -         |
|        | PLI                                 | + 12.9    |
|        | CS4                                 | -         |
|        | J3                                  | + 2455    |

## Control Structures

- 1908 5      control variable form is the only form
- |         |          |
|---------|----------|
| CHOL    | -        |
| IRONMAN | - 6E, 6F |
| J73C    | -        |
| J73I    | - 3.9    |
| PASCAL  | n        |
| PLI     | - 12.9   |
| CS4     | n        |
| J3      | + 2455   |
- 
- 1909 5      initialization form is provided
- |         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | + 6A     |
| J73C    | +        |
| J73I    | + 3.9    |
| PASCAL  | n        |
| PLI     | + 12.9   |
| CS4     | n        |
| J3      | + 2455.6 |
- 
- 1910 5      replacement clause provided
- |         |                             |
|---------|-----------------------------|
| CHOL    | +                           |
| IRONMAN | - 6A                        |
| J73C    | +                           |
| J73I    | + 3.9 (THEN replacement)    |
| PASCAL  | n                           |
| PLI     | + 12.9 (REPEAT replacement) |
| CS4     | n                           |
| J3      | + 2455.6                    |
- 
- 1911 4      WHILE and UNTIL form both supported
- |         |      |
|---------|------|
| CHOL    | o    |
| IRONMAN | - 6A |
| J73C    | o    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |
- 
- 1912 4      conditional compilation
- |         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | + 6E       |
| J73C    | +          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | - 7.1, 4.7 |
| J3      | -          |

## Control Structures

1913 4    implicit scope of constituent's local declarations...

|         |   |
|---------|---|
| CHOL    | o |
| IRONMAN | . |
| J73C    | o |

1914 5    WHILE expression is an implicit block expression

|         |          |
|---------|----------|
| CHOL    | -        |
| IRONMAN | - 6A, 4C |
| J73C    | -        |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | -        |
| J3      | -        |

1915 5    DO clause is an implicit block clause

|         |                                    |
|---------|------------------------------------|
| CHOL    | -                                  |
| IRONMAN | o 6A, 6G (permitted, not required) |
| J73C    | -                                  |
| J73I    | -                                  |
| PASCAL  | -                                  |
| PLI     | -                                  |
| CS4     | + 4.7 (for labels only)            |
| J3      | -                                  |

1916 6    DO clause is internal to WHILE expression

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n 6A, 4C |
| J73C    | n *      |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | -        |
| J3      | -        |

1917 3    fixed number of iterations (FOR statement)

|         |                         |
|---------|-------------------------|
| CHOL    | +                       |
| IRONMAN | + 6F                    |
| J73C    | +                       |
| J73I    | + 3.9 (BY increment)    |
| PASCAL  | + 9.2.3.3               |
| PLI     | + 12.9 (BY increment)   |
| CS4     | + 4.7                   |
| J3      | + 2455.1-.4, 2456, 2458 |

## Control Structures

- 1918 4 control variable...
- |         |        |
|---------|--------|
| CHOL    | +      |
| IRONMAN | o [6F] |
| J73C    | +      |
| J73I    | +      |
| PASCAL  | +      |
| PLI     | +      |
| CS4     | +      |
| J3      | +      |
- 1919 5 limited to discrete values
- |         |                             |
|---------|-----------------------------|
| CHOL    | +                           |
| IRONMAN | + 6F                        |
| J73C    | + (if RESTRICTED)           |
| J73I    | - 3.9 (real type permitted) |
| PASCAL  | + 9.2.3.3                   |
| PLI     | - 12.9                      |
| CS4     | + 4.7                       |
| J3      | + 2455.3                    |
- 1920 5 character data type permitted
- |         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | o [6F]   |
| J73C    | +        |
| J73I    | - 3.9    |
| PASCAL  | +        |
| PLI     | + 12.9   |
| CS4     | -        |
| J3      | - 2455.3 |
- 1921 6 single characters
- |         |             |
|---------|-------------|
| CHOL    | + (char(1)) |
| IRONMAN | + 6F, 3-2D  |
| J73C    | + (char(1)) |
| J73I    | n           |
| PASCAL  | + 9.2.3.3   |
| PLI     | n           |
| CS4     | n           |
| J3      | n           |
- 1922 6 character strings, with implicit conversions
- |         |            |
|---------|------------|
| CHOL    | -          |
| IRONMAN | - 6F, 3-2D |
| J73C    | -          |
| J73I    | n          |
| PASCAL  | -          |
| PLI     | + 12.9     |
| CS4     | n          |
| J3      | n          |



## Control Structures

1923 5      subscripts on control variables...

|         |        |
|---------|--------|
| CHOL    | -      |
| IRONMAN | o [6F] |
| J73C    | -      |
| J73I    | -      |
| PASCAL  | -      |
| PLI     | +      |
| CS4     | - 4.7  |
| J3      | -      |

1924 6      evaluated only once

|         |        |
|---------|--------|
| CHOL    | n *    |
| IRONMAN | o [6F] |
| J73C    | n *    |
| J73I    | -      |
| PASCAL  | -      |
| PLI     | + 12.9 |
| CS4     | -      |
| J3      | -      |

1925 6      evaluated each iteration

|         |        |
|---------|--------|
| CHOL    | n *    |
| IRONMAN | o [6F] |
| J73C    | n *    |
| J73I    | -      |
| PASCAL  | -      |
| PLI     | -      |
| CS4     | -      |
| J3      | -      |

1926 6      no subscripts permitted

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | o [6F]    |
| J73C    | +         |
| J73I    | + 3.9     |
| PASCAL  | + 9.2.3.3 |
| PLI     | -         |
| CS4     | + 4.7     |
| J3      | + 2455.1  |

1927 5      read-only

|         |                    |
|---------|--------------------|
| CHOL    | +                  |
| IRONMAN | + 6F               |
| J73C    | + (if RESTRICTED)  |
| J73I    | - 3.9.2            |
| PASCAL  | + 9.2.3.3          |
| PLI     | - 12.9             |
| CS4     | + 4.7              |
| J3      | - 2475.2c, 2426.1a |

## Control Structures

|        |                              |
|--------|------------------------------|
| 1928 5 | accessible only within loop  |
|        | CHOL -                       |
|        | IRONMAN + 6F                 |
|        | J73C -                       |
|        | J73I - 1.3.3, 3.9.2          |
|        | PASCAL - 9.2.3.3, 4.C.3      |
|        | PLI - 12.9                   |
|        | CS4 + 4.7                    |
|        | J3 + 2456.3                  |
| 1929 5 | value undefined on loop exit |
|        | CHOL +                       |
|        | IRONMAN + 6F                 |
|        | J73C + (if RESTRICTED)       |
|        | J73I - 3.9.2                 |
|        | PASCAL + 9.2.3.3, 4.C.3      |
|        | PLI - 12.9                   |
|        | CS4 + 4.7                    |
|        | J3 + 2456.5                  |
| 1930 5 | multiple control variables   |
|        | CHOL -                       |
|        | IRONMAN o 1A, 6F             |
|        | J73C -                       |
|        | J73I - 3.9.1                 |
|        | PASCAL -                     |
|        | PLI - 12.9                   |
|        | CS4 -                        |
|        | J3 + 2455.14                 |
| 1931 5 | may be omitted               |
|        | CHOL +                       |
|        | IRONMAN ? 6A, 6F             |
|        | J73C +                       |
|        | J73I - 3.9.1                 |
|        | PASCAL - 9.2.3.3             |
|        | PLI - 12.9                   |
|        | CS4 + 4.7                    |
|        | J3 - 2455                    |
| 1932 4 | initial value...             |
|        | CHOL +                       |
|        | IRONMAN + 6F                 |
|        | J73C +                       |
|        | J73I + 3.9                   |
|        | PASCAL + 9.2.3.3             |
|        | PLI + 12.9                   |
|        | CS4 + 4.7                    |
|        | J3 + 2455.1-.3               |

## Control Structures

1933 5      same conversions as in assignment statement

|         |   |                       |
|---------|---|-----------------------|
| CHOL    | + | (i.e., none)          |
| IRONMAN | + | 3B (i.e., none)       |
| J73C    | + |                       |
| J73I    | + | 3.9.2                 |
| PASCAL  | + | 9.2.3.3, 9.1.1        |
| PLI     | + | 12.9                  |
| CS4     | + | 4.7, 4.2 (i.e., none) |
| J3      | + | 2455.3                |

1934 5      may be omitted

|         |   |        |
|---------|---|--------|
| CHOL    | o |        |
| IRONMAN | ? | 1C, 6F |
| J73C    | + |        |
| J73I    | + | 3.9.1  |
| PASCAL  | - |        |
| PLI     | - |        |
| CS4     | - | 4.7    |
| J3      | - | 2455   |

1935 4      increment value...

|         |   |                    |
|---------|---|--------------------|
| CHOL    | + |                    |
| IRONMAN | + | 6F                 |
| J73C    | + |                    |
| J73I    | + | 3.9 (BY increment) |
| PASCAL  | + | 9.2.3.3            |
| PLI     | + | 12.9               |
| CS4     | + |                    |
| J3      | + | 2455.1-.3, 2455.6  |

1936 5      always omitted

|         |   |         |
|---------|---|---------|
| CHOL    | - |         |
| IRONMAN | - | 1C, 6F  |
| J73C    | - |         |
| J73I    | - |         |
| PASCAL  | + | 9.2.3.3 |
| PLI     | - |         |
| CS4     | + | 4.7     |
| J3      | - |         |

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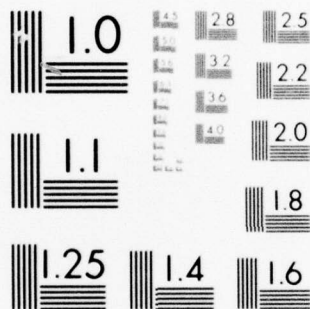
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A



## Control Structures

|        |                                                                   |
|--------|-------------------------------------------------------------------|
| 1937 5 | defaults to successor value                                       |
|        | CHOL o                                                            |
|        | IRONMAN + 1C, 6F                                                  |
|        | J73C o                                                            |
|        | J73I - 3.9                                                        |
|        | PASCAL + 9.2.3.3                                                  |
|        | PLI - 12.9 (defaults to 1, regardless of control variable's type) |
|        | CS4 + 4.7                                                         |
|        | J3 -                                                              |
| 1938 5 | required                                                          |
|        | CHOL o                                                            |
|        | IRONMAN o [6F]                                                    |
|        | J73C o                                                            |
|        | J73I + 3.9                                                        |
|        | PASCAL - 9.2.3.3                                                  |
|        | PLI - 12.9                                                        |
|        | CS4 - 4.7                                                         |
|        | J3 + 2455.1-.3, 2455.6, 2455.8                                    |
| 1939 5 | restricted to constant value                                      |
|        | CHOL o                                                            |
|        | IRONMAN o 1A, 1D, 1F, 6F                                          |
|        | J73C + (if RESTRICTED)                                            |
|        | J73I -                                                            |
|        | PASCAL n 9.2.3.3                                                  |
|        | PLI -                                                             |
|        | CS4 n 4.7                                                         |
|        | J3 -                                                              |
| 1940 5 | non-constant expressions permitted                                |
|        | CHOL o                                                            |
|        | IRONMAN o 1A, 1D, 1F, 6F                                          |
|        | J73C +                                                            |
|        | J73I + 3.9                                                        |
|        | PASCAL n                                                          |
|        | PLI + 12.9                                                        |
|        | CS4 n                                                             |
|        | J3 + 2455.1, 2455.3                                               |

## Control Structures

|        |                                       |
|--------|---------------------------------------|
| 1941 6 | evaluated once                        |
|        | CHOL +                                |
|        | IRONMAN o 1C, 6F                      |
|        | J73C -                                |
|        | J73I -                                |
|        | PASCAL n                              |
|        | PLI + 12.9                            |
|        | CS4 n                                 |
|        | J3 -                                  |
| 1942 6 | evaluated each iteration              |
|        | CHOL -                                |
|        | IRONMAN o 1C, 6F                      |
|        | J73C + (unless RESTRICTED)            |
|        | J73I + 3.9.2                          |
|        | PASCAL n                              |
|        | PLI -                                 |
|        | CS4 n                                 |
|        | J3 + 2455.3, 2458                     |
| 1943 5 | conversions                           |
|        | CHOL -                                |
|        | IRONMAN - 3B                          |
|        | J73C + (unless RESTRICTED)            |
|        | J73I + 3.9                            |
|        | PASCAL n                              |
|        | PLI + 12.9                            |
|        | CS4 n                                 |
|        | J3 + 2455.3                           |
| 1944 6 | normal implicit conversions permitted |
|        | CHOL + (i.e., none)                   |
|        | IRONMAN + 3B (i.e., none)             |
|        | J73C +                                |
|        | J73I + 3.9.2                          |
|        | PASCAL n                              |
|        | PLI + 12.9                            |
|        | CS4 n                                 |
|        | J3 + 2455.3                           |
| 1945 6 | mixed mode arithmetic permitted       |
|        | CHOL n *                              |
|        | IRONMAN n * 3B                        |
|        | J73C + (unless RESTRICTED)            |
|        | J73I + 3.9                            |
|        | PASCAL n                              |
|        | PLI + 12.9                            |
|        | CS4 n                                 |
|        | J3 + 2455.3                           |

## Control Structures

1946 4      termination value...

|         |             |
|---------|-------------|
| CHOL    | +           |
| IRONMAN | o [6F]      |
| J73C    | +           |
| J73I    | + 3.9       |
| PASCAL  | + 9.2.3.3   |
| PLI     | + 12.9      |
| CS4     | + 4.7       |
| J3      | + 2455.1-.3 |

1947 5      tested before first iteration

|         |                       |
|---------|-----------------------|
| CHOL    | +                     |
| IRONMAN | + 1B, 6F              |
| J73C    | +                     |
| J73I    | + 3.9.2               |
| PASCAL  | + 9.2.3.3, 4.C.3      |
| PLI     | + 12.9                |
| CS4     | + 4.7, 3.2.1.1, 3.3.1 |
| J3      | -                     |

1948 5      tested after first iteration

|         |                |
|---------|----------------|
| CHOL    | -              |
| IRONMAN | - 1B, 6F       |
| J73C    | -              |
| J73I    | -              |
| PASCAL  | -              |
| PLI     | -              |
| CS4     | -              |
| J3      | + 2455.3, 2458 |

1949 5      evaluated once

|         |                   |
|---------|-------------------|
| CHOL    | +                 |
| IRONMAN | o 6E, 6F          |
| J73C    | + (if RESTRICTED) |
| J73I    | - 3.9.2           |
| PASCAL  | + 9.2.3.3, 4.C.3  |
| PLI     | + 12.9            |
| CS4     | + 4.7             |
| J3      | -                 |

1950 5      contains only read-only variables

|         |           |
|---------|-----------|
| CHOL    | o         |
| IRONMAN | o 6E, 6F  |
| J73C    | -         |
| J73I    | - 3.9.2   |
| PASCAL  | - 9.2.3.3 |
| PLI     | - 12.9    |
| CS4     | + 4.7     |
| J3      | - 2456.2  |

## Control Structures

|        |                                       |
|--------|---------------------------------------|
| 1951 5 | evaluated repeatedly                  |
|        | CHOL -                                |
|        | IRONMAN o 6E, 6F                      |
|        | J73C + (unless RESTRICTED)            |
|        | J73I + 3.9.2                          |
|        | PASCAL -                              |
|        | PLI - 12.9                            |
|        | CS4 -                                 |
|        | J3 + 2455.3, 2458                     |
| 1952 5 | conversions...                        |
|        | CHOL -                                |
|        | IRONMAN .                             |
|        | J73C + (unless RESTRICTED)            |
|        | J73I + 3.9                            |
|        | PASCAL -                              |
|        | PLI + 12.9                            |
|        | CS4 -                                 |
|        | J3 + 2455.3                           |
| 1953 6 | no implicit conversion                |
|        | CHOL +                                |
|        | IRONMAN + 3B                          |
|        | J73C + (if RESTRICTED)                |
|        | J73I -                                |
|        | PASCAL +                              |
|        | PLI -                                 |
|        | CS4 + 4.7                             |
|        | J3 -                                  |
| 1954 6 | implicit conversions permitted        |
|        | CHOL n *                              |
|        | IRONMAN - 3B                          |
|        | J73C + (unless RESTRICTED)            |
|        | J73I + 3.9                            |
|        | PASCAL -                              |
|        | PLI + 12.9                            |
|        | CS4 -                                 |
|        | J3 + 2455.3                           |
| 1955 6 | as in explicit comparison expressions |
|        | CHOL + (i.e., none)                   |
|        | IRONMAN + 3B                          |
|        | J73C +                                |
|        | J73I + 3.9                            |
|        | PASCAL + (i.e., none)                 |
|        | PLI + 12.9                            |
|        | CS4 + 4.7 (i.e., none)                |
|        | J3 + 2455.3                           |



## Control Structures

- 1956 5      may be omitted
- |         |             |
|---------|-------------|
| CHOL    | o           |
| IRONMAN | ? 1C, 6F    |
| J73C    | +           |
| J73I    | + 3.9.1     |
| PASCAL  | - 9.2.3.3   |
| PLI     | + 12.9      |
| CS4     | - 4.7       |
| J3      | + 2455.5-.6 |
- 1957 5      termination value permitted alone
- |         |           |
|---------|-----------|
| CHOL    | o         |
| IRONMAN | ? 1C, 6F  |
| J73C    | o         |
| J73I    | - 3.9     |
| PASCAL  | - 9.2.3.3 |
| PLI     | - 12.9    |
| CS4     | - 4.7     |
| J3      | - 2455    |
- 1958 4      termination conditions instead of values
- |         |                          |
|---------|--------------------------|
| CHOL    | +                        |
| IRONMAN | - 1C, 6F                 |
| J73C    | + (both forms available) |
| J73I    | + 3.9                    |
| PASCAL  | - 9.2.3.3                |
| PLI     | + 12.9                   |
| CS4     | - 4.7                    |
| J3      | + 2455                   |
- 1959 4      sequence of iteration clauses permitted
- |         |           |
|---------|-----------|
| CHOL    | o         |
| IRONMAN | ? 6E      |
| J73C    | o         |
| J73I    | - 3.9     |
| PASCAL  | - 9.2.3.3 |
| PLI     | + 12.9    |
| CS4     | - 4.7     |
| J3      | - 2455    |
- 1960 4      interchangeable increment and termination clauses
- |         |                  |
|---------|------------------|
| CHOL    | o                |
| IRONMAN | ? 1B, 6E         |
| J73C    | +                |
| J73I    | + 3.9.1          |
| PASCAL  | n                |
| PLI     | + 12.9           |
| CS4     | n 4.7            |
| J3      | - 2455.1, 2455.3 |



## Control Structures

### 1961 4 conditional compilation

|         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | + 6E       |
| J73C    | +          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | - 7.1, 4.7 |
| J3      | -          |

### 1962 3 loop exiting (from anywhere within loop)...

|         |              |
|---------|--------------|
| CHOL    | o [2.2.4]    |
| IRONMAN | ? 6A, 6F, 6E |
| J73C    | o [2.2.4]    |

### 1963 4 single level exit statement

|         |                  |
|---------|------------------|
| CHOL    | -                |
| IRONMAN | ? * [6A, 6F, 6E] |
| J73C    | -                |
| J73I    | -                |
| PASCAL  | -                |
| PLI     | -                |
| CS4     | + 4.8            |
| J3      | -                |

### 1964 4 multi-level exit

|         |                  |
|---------|------------------|
| CHOL    | -                |
| IRONMAN | ? * [6A, 6F, 6E] |
| J73C    | -                |
| J73I    | -                |
| PASCAL  | -                |
| PLI     | -                |
| CS4     | + 4.8            |
| J3      | -                |

### 1965 4 exception condition

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | ? * [6A, 6F, 6E] |
| J73C    | +                |
| J73I    | n                |
| PASCAL  | n                |
| PLI     | -                |
| CS4     | -                |
| J3      | n                |

## Control Structures

- 1966 4    go to statement
- |         |     |                       |
|---------|-----|-----------------------|
| CHOL    | +   | (But not recommended) |
| IRONMAN | ? * | [6A, 6F, 6E]          |
| J73C    | +   | (but not recommended) |
| J73I    | +   | 3.9.2                 |
| PASCAL  | +   | 9.1.3                 |
| PLI     | +   | 12.9, 12.15, 3.4, 3.5 |
| CS4     | +   | 4.10                  |
| J3      | +   | 2444, 2456.5          |
- 
- 1967 4    other control structure exits (RETURN, etc.)
- |         |     |                       |
|---------|-----|-----------------------|
| CHOL    | +   | (But not recommended) |
| IRONMAN | ? * | [6A, 6F, 6E]          |
| J73C    | +   | (but not recommended) |
| J73I    | +   | 3.9.2                 |
| PASCAL  | -   |                       |
| PLI     | +   | 3.4, 3.6, 12.14       |
| CS4     | +   | 4.9                   |
| J3      | +   | 2445.3-.5             |
- 
- 1968 4    forbidden
- |         |     |              |
|---------|-----|--------------|
| CHOL    | -   |              |
| IRONMAN | ? * | [6A, 6F, 6E] |
| J73C    | -   |              |
| J73I    | -   |              |
| PASCAL  | -   |              |
| PLI     | -   |              |
| CS4     | -   |              |
| J3      | -   |              |
- 
- 1969 4    with parameters (for control variable value)
- |         |     |              |
|---------|-----|--------------|
| CHOL    | o   |              |
| IRONMAN | ? * | [6A, 6F, 6E] |
| J73C    | o   |              |
| J73I    | -   |              |
| PASCAL  | -   |              |
| PLI     | -   |              |
| CS4     | -   |              |
| J3      | -   |              |
- 
- 1970 3    skip to next cycle of loop (from anywhere within loop)...
- |         |   |         |
|---------|---|---------|
| CHOL    | o | [2.2.4] |
| IRONMAN | - | 1A, 1B  |
| J73C    | o | [2.2.4] |

## Control Structures

### 1971 4    single level next cycle statement

|         |                   |
|---------|-------------------|
| CHOL    | -                 |
| IRONMAN | n * [1A, 1B]      |
| J73C    | -                 |
| J73I    | -                 |
| PASCAL  | -                 |
| PLI     | -                 |
| CS4     | -                 |
| J3      | + 2445.1-.2, 2458 |

### 1972 4    multi-level next cycle

|         |                   |
|---------|-------------------|
| CHOL    | -                 |
| IRONMAN | n * [1A, 1B]      |
| J73C    | -                 |
| J73I    | -                 |
| PASCAL  | -                 |
| PLI     | -                 |
| CS4     | -                 |
| J3      | + 2445.1-.2, 2458 |

### 1973 4    may be used in...

|         |              |
|---------|--------------|
| CHOL    | o [2.2.4]    |
| IRONMAN | n * [1A, 1B] |
| J73C    | o [2.2.4]    |

### 1974 5    loops with control variables (they are updated)

|         |              |
|---------|--------------|
| CHOL    | n            |
| IRONMAN | n * [1A, 1B] |
| J73C    | n            |
| J73I    | n            |
| PASCAL  | n            |
| PLI     | n            |
| CS4     | n            |
| J3      | + 2458       |

### 1975 5    loops with no control variables

|         |              |
|---------|--------------|
| CHOL    | n            |
| IRONMAN | n * [1A, 1B] |
| J73C    | n            |
| J73I    | n            |
| PASCAL  | n            |
| PLI     | n            |
| CS4     | n            |
| J3      | n            |

## Control Structures

1976 3 definite and indefinite iterations can be combined

|         |                      |
|---------|----------------------|
| CHOL    | -                    |
| IRONMAN | ? 6A                 |
| J73C    | -                    |
| J73I    | - 3.9                |
| PASCAL  | - 9.2.3.3            |
| PLI     | + 12.9               |
| CS4     | + 4.7                |
| J3      | + 2455.9-.10, 2458.4 |

1977 3 lexical extent of loop body...

|         |           |
|---------|-----------|
| CHOL    | o [2.2.4] |
| IRONMAN | o [6E]    |
| J73C    | o [2.2.4] |

1978 4 defined by required terminator

|         |                    |
|---------|--------------------|
| CHOL    | o                  |
| IRONMAN | + 2D, 6A, 6E       |
| J73C    | -                  |
| J73I    | -                  |
| PASCAL  | -                  |
| PLI     | + 12.9, 2.3, 12.10 |
| CS4     | + 4.7              |
| J3      | -                  |

1979 5 is distinctive

|         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | + 6A, 6E |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | - 12.10  |
| CS4     | -        |
| J3      | n        |

1980 4 defined by compound statement

|         |                    |
|---------|--------------------|
| CHOL    | o                  |
| IRONMAN | - 2D, 6A           |
| J73C    | +                  |
| J73I    | + 3.9.1            |
| PASCAL  | + 9.2.3.3          |
| PLI     | -                  |
| CS4     | -                  |
| J3      | + 2455.11, 2455.14 |



## Control Structures

### 1981 4 multiple closure permitted

|         |       |
|---------|-------|
| CHOL    | -     |
| IRONMAN | - 2D  |
| J73C    | -     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | + 2.4 |
| CS4     | - 4.7 |
| J3      | -     |

### 1982 2 unconditional transfer of control

|         |      |
|---------|------|
| CHOL    | +    |
| IRONMAN | + 6G |
| J73C    | +    |
| J73I    | +    |
| PASCAL  | +    |
| PLI     | +    |
| CS4     | +    |
| J3      | +    |

### 1983 3 unconditional goto statement

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | + 6G    |
| J73C    | +       |
| J73I    | + 3.4   |
| PASCAL  | + 9.1.3 |
| PLI     | + 12.15 |
| CS4     | + 4.10  |
| J3      | + 2444  |

### 1984 3 indexed goto statement

|         |                                   |
|---------|-----------------------------------|
| CHOL    | -                                 |
| IRONMAN | - 6G                              |
| J73C    | -                                 |
| J73I    | -                                 |
| PASCAL  | -                                 |
| PLI     | + 12.15 (subscript a label array) |
| CS4     | -                                 |
| J3      | + 2481                            |

### 1985 4 effect when index is out of range...

|         |     |
|---------|-----|
| CHOL    | n * |
| IRONMAN | n   |
| J73C    | n   |
| J73I    | n   |
| PASCAL  | n   |
| CS4     | n   |



## Control Structures

1986 5 statement ignored

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | n        |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | -        |
| CS4     | n        |
| J3      | + 2481.6 |

1987 5 statement is undefined

|         |     |
|---------|-----|
| CHOL    | n * |
| IRONMAN | n   |
| J73C    | n   |
| J73I    | n   |
| PASCAL  | n   |
| PLI     | -   |
| CS4     | n   |
| J3      | -   |

1988 5 implementation-defined

|         |     |
|---------|-----|
| CHOL    | n * |
| IRONMAN | n   |
| J73C    | n   |
| J73I    | n   |
| PASCAL  | n   |
| PLI     | -   |
| CS4     | n   |
| J3      | -   |

1989 5 exception condition

|         |                            |
|---------|----------------------------|
| CHOL    | n *                        |
| IRONMAN | n *                        |
| J73C    | n                          |
| J73I    | n                          |
| PASCAL  | n                          |
| PLI     | + 10.4.16 (subscriptrange) |
| CS4     | n                          |
| J3      | -                          |

1990 4 methods for specifying index range...

|         |     |
|---------|-----|
| CHOL    | n * |
| IRONMAN | n   |
| J73C    | n   |
| J73I    | n   |
| PASCAL  | n   |
| CS4     | n   |

## Control Structures

|      |   |                                                            |                         |
|------|---|------------------------------------------------------------|-------------------------|
| 1991 | 5 | switch declarations                                        |                         |
|      |   | CHOL                                                       | n *                     |
|      |   | IRONMAN                                                    | n                       |
|      |   | J73C                                                       | n                       |
|      |   | J73I                                                       | n                       |
|      |   | PASCAL                                                     | n                       |
|      |   | PLI                                                        | -                       |
|      |   | CS4                                                        | n                       |
|      |   | J3                                                         | + 2481                  |
| 1992 | 5 | subscripted statement labels                               |                         |
|      |   | CHOL                                                       | n *                     |
|      |   | IRONMAN                                                    | n                       |
|      |   | J73C                                                       | n                       |
|      |   | J73I                                                       | n                       |
|      |   | PASCAL                                                     | n                       |
|      |   | PLI                                                        | + 2.5.1                 |
|      |   | CS4                                                        | n                       |
|      |   | J3                                                         | -                       |
| 1993 | 5 | as part of indexed goto statement                          |                         |
|      |   | CHOL                                                       | n *                     |
|      |   | IRONMAN                                                    | n                       |
|      |   | J73C                                                       | n                       |
|      |   | J73I                                                       | n                       |
|      |   | PASCAL                                                     | n                       |
|      |   | PLI                                                        | -                       |
|      |   | CS4                                                        | n                       |
|      |   | J3                                                         | -                       |
| 1994 | 3 | restrictions on gotos...                                   |                         |
|      |   | CHOL                                                       | o                       |
|      |   | IRONMAN                                                    | o [6G]                  |
|      |   | J73C                                                       | o                       |
|      |   | J3                                                         | 2489                    |
| 1995 | 4 | can jump to label value located outside the procedure body |                         |
|      |   | CHOL                                                       | +                       |
|      |   | IRONMAN                                                    | - 6G                    |
|      |   | J73C                                                       | +                       |
|      |   | J73I                                                       | + 3.4, 1.3.3, 2.6.2.2.3 |
|      |   | PASCAL                                                     | + 9.1.3                 |
|      |   | PLI                                                        | + 3.5, 12.15            |
|      |   | CS4                                                        | - 4.10.2                |
|      |   | J3                                                         | + 2484.11, 2444         |

## Control Structures

|        |                                      |                                                                                                                                             |
|--------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 1996 5 | via label constant                   | CHOL +<br>IRONMAN n * [6G]<br>J73C +<br>J73I + 3.4<br>PASCAL + 9.1.3<br>PLI + 12.15<br>CS4 -<br>J3 + 2484.11                                |
| 1997 5 | via label parameter                  | CHOL -<br>IRONMAN n * [6G]<br>J73C + (unless RESTRICTED)<br>J73I + 3.4, 2.2.3.3<br>PASCAL n<br>PLI + 12.15<br>CS4 n<br>J3 + 2484.11, 2484.5 |
| 1998 5 | via label valued expression          | CHOL n<br>IRONMAN n * [6G]<br>J73C n<br>J73I n<br>PASCAL n<br>PLI + 12.15<br>CS4 n<br>J3 + 2444, 2480-1                                     |
| 1999 4 | can jump into loops                  | CHOL -<br>IRONMAN - 6G<br>J73C -<br>J73I - 3.9.2<br>PASCAL - U4.E<br>PLI - 12.9<br>CS4 - 4.0, 4.7, 4.10.1<br>J3 - 2456.3-.4                 |
| 2000 4 | can jump into THEN and ELSE branches | CHOL -<br>IRONMAN - 6G<br>J73C + (unless RESTRICTED)<br>J73I + 3.7<br>PASCAL - U4.E<br>PLI + 12.16<br>CS4 - 4.0, 4.5, 4.10.1<br>J3 + 2453-4 |

## Control Structures

2001 4 can jump into case clauses

|         |                       |
|---------|-----------------------|
| CHOL    | -                     |
| IRONMAN | - 6G                  |
| J73C    | + (unless RESTRICTED) |
| J73I    | + 3.8                 |
| PASCAL  | - U4.E                |
| PLI     | n                     |
| CS4     | - 4.10.1              |
| J3      | + 2482                |

2002 4 can jump from one case constituent to another

|         |                       |
|---------|-----------------------|
| CHOL    | -                     |
| IRONMAN | + 6G                  |
| J73C    | + (unless RESTRICTED) |
| J73I    | + 3.8                 |
| PASCAL  | + 9.2.2.2             |
| PLI     | n                     |
| CS4     | - 4.0, 4.6, 4.10.1    |
| J3      | + 2482                |

2003 2 STOP statement

|         |                        |
|---------|------------------------|
| CHOL    | -                      |
| IRONMAN | o                      |
| J73C    | +                      |
| J73I    | + 3.5                  |
| PASCAL  | -                      |
| PLI     | - 12.27, 10.4.6, 12.24 |
| CS4     | -                      |
| J3      | + 2445.4-.5            |

2004 2 exception conditions (programmer-defined)

|         |                 |
|---------|-----------------|
| CHOL    | +               |
| IRONMAN | + 10A, 10C, 10D |
| J73C    | +               |
| J73I    | -               |
| PASCAL  | -               |
| PLI     | + 10            |
| CS4     | + 5.3           |
| J3      | -               |

2005 3 capabilities equivalent to system-defined exceptions

|         |                      |
|---------|----------------------|
| CHOL    | +                    |
| IRONMAN | + 10A, 10C, 10D, 10G |
| J73C    | +                    |
| J73I    | n                    |
| PASCAL  | n                    |
| PLI     | - 10.4.21            |
| CS4     | +                    |
| J3      | n                    |

## Control Structures

### 2006 3 ability to terminate operations

|         |                       |
|---------|-----------------------|
| CHOL    | +                     |
| IRONMAN | + 10C                 |
| J73C    | +                     |
| J73I    | -                     |
| PASCAL  | -                     |
| PLI     | + 10.3, 10.3.1, 3.6.3 |
| CS4     | + 4.12                |
| J3      | -                     |

### 2007 3 ability to resume operations

|         |                       |
|---------|-----------------------|
| CHOL    | o                     |
| IRONMAN | - 10C                 |
| J73C    | o                     |
| J73I    | -                     |
| PASCAL  | -                     |
| PLI     | + 10.3, 10.3.1, 3.6.3 |
| CS4     | + 5.3.3               |
| J3      | -                     |

### 2008 3 ability to disable and enable exceptions

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | + 10G   |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | + 10.2  |
| CS4     | + 7.3.2 |
| J3      | -       |

### 2009 3 default exceptions

|         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | - 10C, 10D |
| J73C    | +          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | + 10.3     |
| CS4     | + F        |
| J3      | -          |

### 2010 3 control flow (resumption) constraints expressed

|         |   |
|---------|---|
| CHOL    | o |
| IRONMAN | n |
| J73C    | o |
| J73I    | - |
| PASCAL  | - |
| PLI     | - |
| CS4     | - |
| J3      | - |



## Control Structures

### 2011 3 ability to associate parameters with exceptions

|         |                   |
|---------|-------------------|
| CHOL    | +                 |
| IRONMAN | o [10A, 10C, 10D] |
| J73C    | +                 |
| J73I    | -                 |
| PASCAL  | -                 |
| PLI     | - 10              |
| CS4     | + 5.3.1           |
| J3      | -                 |

### 2012 3 associate handlers with several activation points

|         |               |
|---------|---------------|
| CHOL    | +             |
| IRONMAN | .             |
| J73C    | +             |
| J73I    | -             |
| PASCAL  | -             |
| PLI     | + 10.3, 12.19 |
| CS4     | + 5.3.2       |
| J3      | -             |

### 2013 4 statically

|         |                    |
|---------|--------------------|
| CHOL    | +                  |
| IRONMAN | o 5C, 7C, 10A, 10D |
| J73C    | +                  |
| J73I    | -                  |
| PASCAL  | -                  |
| PLI     | -                  |
| CS4     | + 5.3.2            |
| J3      | -                  |

### 2014 4 dynamically

|         |                    |
|---------|--------------------|
| CHOL    | -                  |
| IRONMAN | - 5C, 7C, 10A, 10D |
| J73C    | -                  |
| J73I    | -                  |
| PASCAL  | -                  |
| PLI     | + 10.3, 12.19      |
| CS4     | -                  |
| J3      | -                  |

### 2015 3 cleanup exceptions

|         |       |
|---------|-------|
| CHOL    | o     |
| IRONMAN | - 10C |
| J73C    | o     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | -     |
| J3      | -     |

## Control Structures

2016 3 ability to control how exceptions are implemented

|         |                |
|---------|----------------|
| CHOL    | o              |
| IRONMAN | ? 11F, 1D, 10A |
| J73C    | o              |
| J73I    | n              |
| PASCAL  | n              |
| PLI     | -              |
| CS4     | -              |
| J3      | n              |

2017 4 status values

|         |                    |
|---------|--------------------|
| CHOL    | +                  |
| IRONMAN | ? * [11F, 1D, 10A] |
| J73C    | +                  |
| J73I    | n                  |
| PASCAL  | n                  |
| PLI     | n                  |
| CS4     | n                  |
| J3      | n                  |

2018 5 as parameters

|         |                    |
|---------|--------------------|
| CHOL    | +                  |
| IRONMAN | ? * [11F, 1D, 10A] |
| J73C    | +                  |
| J73I    | n                  |
| PASCAL  | n                  |
| PLI     | n                  |
| CS4     | n                  |
| J3      | n                  |

2019 5 as function values

|         |                    |
|---------|--------------------|
| CHOL    | +                  |
| IRONMAN | ? * [11F, 1D, 10A] |
| J73C    | +                  |
| J73I    | n                  |
| PASCAL  | n                  |
| PLI     | n                  |
| CS4     | n                  |
| J3      | n                  |

2020 4 procedure parameters

|         |                    |
|---------|--------------------|
| CHOL    | +                  |
| IRONMAN | ? * [11F, 1D, 10A] |
| J73C    | +                  |
| J73I    | n                  |
| PASCAL  | n                  |
| PLI     | n                  |
| CS4     | n                  |
| J3      | n                  |

## Control Structures

### 2021 4 label parameters

|         |                    |
|---------|--------------------|
| CHOL    | -                  |
| IRONMAN | ? * [11F, 1D, 10A] |
| J73C    | -                  |
| J73I    | n                  |
| PASCAL  | n                  |
| PLI     | n                  |
| CS4     | n                  |
| J3      | n                  |

### 2022 4 dynamic stack search

|         |                    |
|---------|--------------------|
| CHOL    | -                  |
| IRONMAN | ? * [11F, 1D, 10A] |
| J73C    | -                  |
| J73I    | n                  |
| PASCAL  | n                  |
| PLI     | n                  |
| CS4     | n                  |
| J3      | n                  |

### 2023 2 parallel processing primitives

|         |              |
|---------|--------------|
| CHOL    | +            |
| IRONMAN | + 9A, 9B     |
| J73C    | +            |
| J73I    | -            |
| PASCAL  | -            |
| PLI     | - 3.2        |
| CS4     | + II.3, II.4 |
| J3      | -            |

### 2024 3 create a process

|         |                  |
|---------|------------------|
| CHOL    | - (By extension) |
| IRONMAN | + 9A, 9B         |
| J73C    | - (by extension) |
| J73I    | -                |
| PASCAL  | -                |
| PLI     | -                |
| CS4     | + II.3.2         |
| J3      | -                |

### 2025 3 terminate a process

|         |                  |
|---------|------------------|
| CHOL    | - (By extension) |
| IRONMAN | + 9A             |
| J73C    | - (by extension) |
| J73I    | -                |
| PASCAL  | -                |
| PLI     | -                |
| CS4     | + II.3.3         |
| J3      | -                |

## Control Structures

### 2026 3 critical section control primitives

CHOL + (Implementation programmer defined)  
IRONMAN + 9C, 9B  
J73C + (implementation programmer defined)  
J73I -  
PASCAL -  
PLI -  
CS4 +  
J3 -

### 2027 4 test-and-set indivisible operation

CHOL - (By extension)  
IRONMAN o [9C, 9B]  
J73C - (by extension)  
J73I -  
PASCAL -  
PLI + 13.6.17  
CS4 -  
J3 -

### 2028 4 events, signal and wait

CHOL o  
IRONMAN o [9C, 9B]  
J73C o  
J73I -  
PASCAL -  
PLI -  
CS4 + 11.4.2  
J3 -

### 2029 4 binary semaphores

CHOL o  
IRONMAN o [9C, 9B]  
J73C o  
J73I -  
PASCAL -  
PLI -  
CS4 -  
J3 -

### 2030 4 integer semaphores

CHOL o  
IRONMAN o [9C, 9B]  
J73C o  
J73I -  
PASCAL -  
PLI -  
CS4 -  
J3 -

## Control Structures

### 2031 4 resource semaphores

|         |            |
|---------|------------|
| CHOL    | o          |
| IRONMAN | o [9C, 9B] |
| J73C    | o          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | -          |
| J3      | -          |

### 2032 4 lexical critical sections

|         |            |
|---------|------------|
| CHOL    | -          |
| IRONMAN | o [9C, 9B] |
| J73C    | +          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | + 4.4      |
| J3      | -          |

### 2033 5 conditional

|         |            |
|---------|------------|
| CHOL    | n *        |
| IRONMAN | o [9C, 9B] |
| J73C    | -          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | -          |
| J3      | -          |

### 2034 4 monitors

|         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | o [9C, 9B] |
| J73C    | -          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | -          |
| J3      | -          |

### 2035 4 message passing

|         |            |
|---------|------------|
| CHOL    | -          |
| IRONMAN | o [9C, 9B] |
| J73C    | -          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | + II.4.3   |
| J3      | -          |



## Control Structures

### 2036 3 processes have priorities

|         |                              |
|---------|------------------------------|
| CHOL    | - (Can be done by extension) |
| IRONMAN | + 9D                         |
| J73C    | - (can be done by extension) |
| J73I    | -                            |
| PASCAL  | -                            |
| PLI     | -                            |
| CS4     | + II.3.2                     |
| J3      | -                            |

### 2037 4 programmer controllable

|         |                                      |
|---------|--------------------------------------|
| CHOL    | n *                                  |
| IRONMAN | + 9D                                 |
| J73C    | n *                                  |
| J73I    | -                                    |
| PASCAL  | -                                    |
| PLI     | -                                    |
| CS4     | + II.3.2 (only when process started) |
| J3      | -                                    |

### 2038 3 coroutine primitives

|         |                        |
|---------|------------------------|
| CHOL    | -                      |
| IRONMAN | - 9B (too specialized) |
| J73C    | -                      |
| J73I    | -                      |
| PASCAL  | -                      |
| PLI     | -                      |
| CS4     | -                      |
| J3      | -                      |

### 2039 2 asynchronous interrupt handling features

|         |                    |
|---------|--------------------|
| CHOL    | +                  |
| IRONMAN | - 9C               |
| J73C    | +                  |
| J73I    | -                  |
| PASCAL  | -                  |
| PLI     | -                  |
| CS4     | + II.4.2.1.6, II.I |
| J3      | -                  |

### 2040 2 real-time control

|         |                       |
|---------|-----------------------|
| CHOL    | - (Done by extension) |
| IRONMAN | + 9E                  |
| J73C    | - (done by extension) |
| J73I    | -                     |
| PASCAL  | -                     |
| PLI     | -                     |
| CS4     | + II.3.2              |
| J3      | -                     |

# Control Structures

2041 3 delay until...

|         |      |
|---------|------|
| CHOL    | n *  |
| IRONMAN | + 9E |
| J73C    | n *  |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | +    |
| J3      | -    |

2042 4 specified time

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | + 9E     |
| J73C    | n *      |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | + II.3.2 |
| J3      | -        |

2043 4 condition satisfied

|         |        |
|---------|--------|
| CHOL    | n *    |
| IRONMAN | o [9E] |
| J73C    | n *    |
| J73I    | -      |
| PASCAL  | -      |
| PLI     | -      |
| CS4     | -      |
| J3      | -      |

2044 4 non-busy wait possible

|         |                    |
|---------|--------------------|
| CHOL    | n *                |
| IRONMAN | + 9B               |
| J73C    | n *                |
| J73I    | -                  |
| PASCAL  | -                  |
| PLI     | -                  |
| CS4     | + II.4.2.1.4, II.J |
| J3      | -                  |

2045 3 access to clocks

|         |           |
|---------|-----------|
| CHOL    | n *       |
| IRONMAN | + 9E, 9F  |
| J73C    | n *       |
| J73I    | -         |
| PASCAL  | -         |
| PLI     | + 13.6.18 |
| CS4     | + II.J    |
| J3      | -         |

## Program Development Aids

### 2046 1 Program Development Aids

CHOL o  
IRONMAN o  
J73C o

### 2047 2 character set...

CHOL o  
IRONMAN o  
J73C o

### 2048 3 compatible with 64-char ASCII

CHOL +  
IRONMAN + 2A  
J73C +  
J73I + 5.1  
PASCAL - 3 (upward arrow)  
PLI - 2.6 (underscore, vertical bar)  
CS4 - 1.3.1 (vertical bar, braces, underscore, tilde)  
J3 + 2413

### 2049 3 compatible with 128-char ASCII

CHOL +  
IRONMAN + 2A (only 64-char subset is required)  
J73C +  
J73I + 5.1  
PASCAL + 3  
PLI + 2.6  
CS4 + 1.3.1  
J3 + 2413

### 2050 3 compatible with EBCDIC

CHOL -  
IRONMAN - 2A  
J73C -  
J73I -  
PASCAL - 3 (upward arrow, square brackets)  
PLI + 2.6  
CS4 - 1.3.1 (square brackets, braces, backslash)  
J3 + 2413

### 2051 3 publication form also

CHOL -  
IRONMAN - 2A  
J73C -  
J73I -  
PASCAL + 3, 14.5  
PLI -  
CS4 -  
J3 -

# Program Development Aids

## 2052 2 identifiers...

|         |   |
|---------|---|
| CHOL    | o |
| IRONMAN | o |
| J73C    | o |

## 2053 3 short (1 to 8 characters)

|         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | - 2E |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |

## 2054 3 medium (9 to 16 characters)

|         |           |
|---------|-----------|
| CHOL    | -         |
| IRONMAN | + 13F, 2E |
| J73C    | -         |
| J73I    | -         |
| PASCAL  | -         |
| PLI     | -         |
| CS4     | -         |
| J3      | -         |

## 2055 3 long (more than 16 characters)

|         |                        |
|---------|------------------------|
| CHOL    | -                      |
| IRONMAN | + 13F, 2E              |
| J73C    | -                      |
| J73I    | -                      |
| PASCAL  | -                      |
| PLI     | + 2.6.1 (at most 256)  |
| CS4     | + 1.3.2.1 (at most 32) |
| J3      | -                      |

## 2056 3 unlimited length

|         |               |
|---------|---------------|
| CHOL    | +             |
| IRONMAN | o 13F, 2E, 1E |
| J73C    | +             |
| J73I    | + 1.3.2       |
| PASCAL  | + 4           |
| PLI     | -             |
| CS4     | -             |
| J3      | + 2415.2      |

# Program Development Aids

2057 3 some letters ignored

|         |         |
|---------|---------|
| CHOL    | -       |
| IRONMAN | - 2E    |
| J73C    | +       |
| J73I    | + 1.3.2 |
| PASCAL  | + 14.1  |
| PLI     | -       |
| CS4     | -       |
| J3      | -       |

2058 3 special length restrictions for external identifiers

|         |            |
|---------|------------|
| CHOL    | -          |
| IRONMAN | - 8D       |
| J73C    | -          |
| J73I    | - 1.3, 2.6 |
| PASCAL  | ?          |
| PLI     | - 2.6.1    |
| CS4     | -          |
| J3      | -          |

2059 3 break character permitted

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | + 2E      |
| J73C    | +         |
| J73I    | +         |
| PASCAL  | - 4       |
| PLI     | +         |
| CS4     | + 1.3.2.1 |
| J3      | +         |

2060 4 space

|         |        |
|---------|--------|
| CHOL    | o      |
| IRONMAN | o [2E] |
| J73C    | -      |
| J73I    | -      |
| PASCAL  | - 14.6 |
| PLI     | -      |
| CS4     | -      |
| J3      | -      |

2061 5 is ignored in distinguishing identifiers

|         |        |
|---------|--------|
| CHOL    | o      |
| IRONMAN | o [2E] |
| J73C    | n *    |
| J73I    | -      |
| PASCAL  | -      |
| PLI     | -      |
| CS4     | -      |
| J3      | -      |



# Program Development Aids

## 2062 4 underscore

|         |           |
|---------|-----------|
| CHOL    | o         |
| IRONMAN | o [2E]    |
| J73C    | +         |
| J73I    | -         |
| PASCAL  | -         |
| PLI     | + 2.6.1   |
| CS4     | + 1.3.2.1 |
| J3      | -         |

## 2063 4 other

|         |                                 |
|---------|---------------------------------|
| CHOL    | o                               |
| IRONMAN | o [2E]                          |
| J73C    | + (prime and dollar sign)       |
| J73I    | + 1.3.1 (prime and dollar sign) |
| PASCAL  | -                               |
| PLI     | + 2.6.1 (dollar sign)           |
| CS4     | -                               |
| J3      | + 2415.2 (prime)                |

## 2064 4 permits efficient lexical processing

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | + 1E, 2B |
| J73C    | +        |
| J73I    | +        |
| PASCAL  | +        |
| PLI     | +        |
| CS4     | +        |
| J3      | +        |

## 2065 2 language-defined tokens...

|         |   |
|---------|---|
| CHOL    | o |
| IRONMAN | o |
| J73C    | o |

## 2066 3 key words

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | + 2F    |
| J73C    | +       |
| J73I    | + 5.2.1 |
| PASCAL  | -       |
| PLI     | + 2.6.1 |
| CS4     | + E     |
| J3      | -       |

## Program Development Aids

### 2067 3 reserved words

|         |                 |
|---------|-----------------|
| CHOL    | +               |
| IRONMAN | + 2F            |
| J73C    | -               |
| J73I    | - 1.3, 2, 5.2.1 |
| PASCAL  | + 14.5          |
| PLI     | -               |
| CS4     | + 1.3.2.1       |
| J3      | + 2415          |

### 2068 3 abbreviated forms permitted

|         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | - 2E |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | +    |
| CS4     | -    |
| J3      | -    |

### 2069 2 explicit statement delimiter

|         |      |
|---------|------|
| CHOL    | +    |
| IRONMAN | + 6B |
| J73C    | +    |
| J73I    | +    |
| PASCAL  | +    |
| PLI     | +    |
| CS4     | +    |
| J3      | +    |

### 2070 3 terminator

|         |            |
|---------|------------|
| CHOL    | o          |
| IRONMAN | - 6B       |
| J73C    | +          |
| J73I    | + 3.1      |
| PASCAL  | -          |
| PLI     | + 2.2, 2.3 |
| CS4     | -          |
| J3      | + 2450.1   |

### 2071 3 separator

|         |             |
|---------|-------------|
| CHOL    | o           |
| IRONMAN | - 6B        |
| J73C    | -           |
| J73I    | -           |
| PASCAL  | + 10, 9.2.1 |
| PLI     | -           |
| CS4     | + 2.1       |
| J3-     | -           |

## Program Development Aids

2072 3 either terminator or separator

|         |      |
|---------|------|
| CHOL    | o    |
| IRONMAN | + 6B |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |

2073 2 assignment operator...

|         |   |
|---------|---|
| CHOL    | o |
| IRONMAN | o |
| J73C    | o |

2074 3 distinguished from equal sign

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | + 2D             |
| J73C    | -                |
| J73I    | - 3.3, 5.2.2     |
| PASCAL  | + 9.1.1          |
| PLI     | - 12.2, 7.3.4    |
| CS4     | + 4.2            |
| J3      | + 2442.1, 2437.1 |

2075 3 different operator for copy and share assignment

|         |                  |
|---------|------------------|
| CHOL    | -                |
| IRONMAN | + 1B, 1C, 1E, 2D |
| J73C    | -                |
| J73I    | -                |
| PASCAL  | -                |
| PLI     | -                |
| CS4     | -                |
| J3      | -                |

2076 2 uniform referent notation...

|         |      |
|---------|------|
| CHOL    | o    |
| IRONMAN | . 1E |
| J73C    | o    |

2077 3 syntactically identical

|         |        |
|---------|--------|
| CHOL    | o      |
| IRONMAN | o [1E] |
| J73C    | -      |
| J73I    | -      |
| PASCAL  | -      |
| PLI     | -      |
| CS4     | -      |
| J3      | -      |

# Program Development Aids

## 2078 3 syntactic variation permitted

|         |        |
|---------|--------|
| CHOL    | o      |
| IRONMAN | o [1E] |
| J73C    | -      |
| J73I    | -      |
| PASCAL  | -      |
| PLI     | -      |
| CS4     | -      |
| J3      | -      |

## 2079 3 syntactic variation required

|         |                      |
|---------|----------------------|
| CHOL    | o                    |
| IRONMAN | o [1E]               |
| J73C    | +                    |
| J73I    | + 4.11, 3.10, 4.10   |
| PASCAL  | + 7.2.1, 7.2.2, 8.2  |
| PLI     | + 6.2, 6.4, 6.6, 6.7 |
| CS4     | + 2.4.1, 3.0.p28.6   |
| J3      | + 2432.1, 2424.2     |

## 2080 2 comments

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | o         |
| J73C    | +         |
| J73I    | + 5.4     |
| PASCAL  | + 3       |
| PLI     | + 2.6.4   |
| CS4     | + 1.3.2.8 |
| J3      | + 2415.6  |

## 2081 3 end of line is comment terminator

|         |                                           |
|---------|-------------------------------------------|
| CHOL    | o                                         |
| IRONMAN | ? 2I                                      |
| J73C    | -                                         |
| J73I    | - 5.4                                     |
| PASCAL  | - 3                                       |
| PLI     | - 2.6.4                                   |
| CS4     | + 1.3.2.8 (for comments beginning with %) |
| J3      | - 2415.6                                  |

## 2082 3 semi-colon is comment terminator

|         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | o 2I     |
| J73C    | -        |
| J73I    | - 5.4    |
| PASCAL  | - 3      |
| PLI     | - 2.6.4  |
| CS4     | -        |
| J3      | - 2415.6 |

## Program Development Aids

2083 3 special symbol is comment terminator

|         |                          |
|---------|--------------------------|
| CHOL    | o                        |
| IRONMAN | o 2I                     |
| J73C    | +                        |
| J73I    | + 5.4                    |
| PASCAL  | + 3                      |
| PLI     | + 2.6.4                  |
| CS4     | + 1.3.2.8 (} or newline) |
| J3      | + 2415.6                 |

2084 3 statement delimiter permitted in comment

|         |           |
|---------|-----------|
| CHOL    | o         |
| IRONMAN | o 2I      |
| J73C    | +         |
| J73I    | + 5.4     |
| PASCAL  | + 3       |
| PLI     | + 2.6.4   |
| CS4     | + 1.3.2.8 |
| J3      | - 2415.6  |

2085 3 begin and end comment symbols are identical

|         |           |
|---------|-----------|
| CHOL    | o         |
| IRONMAN | o 2I      |
| J73C    | +         |
| J73I    | + 5.4     |
| PASCAL  | - 3       |
| PLI     | - 2.6.4   |
| CS4     | - 1.3.2.8 |
| J3      | + 2415.6  |

2086 3 comments are nestable

|         |                                |
|---------|--------------------------------|
| CHOL    | o                              |
| IRONMAN | o 2I                           |
| J73C    | -                              |
| J73I    | - 5.4                          |
| PASCAL  | - 3                            |
| PLI     | - 2.6.4                        |
| CS4     | + 1.3.2.8 ({} form of comment) |
| J3      | - 2415.6                       |

2087 3 non-printing character permitted in comments

|         |                        |
|---------|------------------------|
| CHOL    | o                      |
| IRONMAN | - 2I (not end of line) |
| J73C    | +                      |
| J73I    | + 5.4, 5.1             |
| PASCAL  | + 3                    |
| PLI     | + 2.6.4                |
| CS4     | + 1.3.2.8 (newline)    |
| J3      | - 2415.6               |



# Program Development Aids

2088 3 anywhere in a program

|         |                |
|---------|----------------|
| CHOL    | +              |
| IRONMAN | + 2I           |
| J73C    | + (almost)     |
| J73I    | + 5.4 (almost) |
| PASCAL  | + 3            |
| PLI     | + 2.6.4        |
| CS4     | + 1.3.2.8      |
| J3      | + 2420.4-.5    |

2089 3 more than one form of comment delimiter

|         |                              |
|---------|------------------------------|
| CHOL    | o                            |
| IRONMAN | ? 2I                         |
| J73C    | -                            |
| J73I    | - 5.4                        |
| PASCAL  | + 3                          |
| PLI     | - 2.6.4                      |
| CS4     | + 1.3.2.8 ({} and % newline) |
| J3      | - 2415.6                     |

2090 4 different forms required in different contexts

|         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | ? 2I |
| J73C    | n    |
| J73I    | n    |
| PASCAL  | - 3  |
| PLI     | n    |
| CS4     | -    |
| J3      | n    |

2091 3 comment introduced with short symbol

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | + 2I      |
| J73C    | +         |
| J73I    | + 5.4     |
| PASCAL  | + 3       |
| PLI     | + 2.6.4   |
| CS4     | + 1.3.2.8 |
| J3      | + 2415.6  |

2092 3 compatible with automatic reformatting

|         |             |
|---------|-------------|
| CHOL    | +           |
| IRONMAN | o           |
| J73C    | +           |
| J73I    | + 5.4       |
| PASCAL  | + 3         |
| PLI     | + 2.6.4     |
| CS4     | + 1.3.2.8   |
| J3      | + 2420.4-.5 |

## Program Development Aids

### 2093 2 free format source code

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | + 2B             |
| J73C    | +                |
| J73I    | + 5.5            |
| PASCAL  | + 14.6, 14.7     |
| PLI     | + 2.6.4          |
| CS4     | + 1.3.2.8, 1.3.3 |
| J3      | + 2420           |

### 2094 2 end of line character...

|         |   |
|---------|---|
| CHOL    | o |
| IRONMAN | o |
| J73C    | o |

### 2095 3 ignored in identifiers

|         |                                                                     |
|---------|---------------------------------------------------------------------|
| CHOL    | o                                                                   |
| IRONMAN | - 2D (depends on whether space is ignored or a break character; 2E) |
| J73C    | -                                                                   |
| J73I    | - 5.2                                                               |
| PASCAL  | - 14.6                                                              |
| PLI     | - 2.6.4                                                             |
| CS4     | - 1.3.2.1                                                           |
| J3      | - 2412                                                              |

### 2096 3 ignored in literals

|         |                                      |
|---------|--------------------------------------|
| CHOL    | o                                    |
| IRONMAN | - 2H, 2G, 2D                         |
| J73C    | -                                    |
| J73I    | - 5.2                                |
| PASCAL  | - 14.6                               |
| PLI     | - 2.6.4                              |
| CS4     | - 1.3.2.2, 1.3.2.3, 1.3.2.4, 1.3.2.5 |
| J3      | - 2412                               |

### 2097 3 included in character literals

|         |                    |
|---------|--------------------|
| CHOL    | o                  |
| IRONMAN | - 2H               |
| J73C    | +                  |
| J73I    | ? 5.1, 5.2, 5.3.5  |
| PASCAL  | - 4, 12.4, 6.2.4   |
| PLI     | + 2.6.4, 2.6.2.2   |
| CS4     | - 1.3.2.4, 1.3.2.5 |
| J3      | ? 2416.2, 2418.9   |

## Program Development Aids

### 2098 2 automatic source code reformatting...

|         |   |
|---------|---|
| CHOL    | o |
| IRONMAN | o |
| J73C    | o |

### 2099 3 permitted

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | o                |
| J73C    | +                |
| J73I    | + 5.5            |
| PASCAL  | + 14.6, 14.7     |
| PLI     | + 2.6.4          |
| CS4     | + 1.3.2.8, 1.3.3 |
| J3      | + 2420           |

### 2100 3 required

|         |   |
|---------|---|
| CHOL    | o |
| IRONMAN | o |
| J73C    | o |
| J73I    | - |
| PASCAL  | - |
| PLI     | - |
| CS4     | - |
| J3      | - |

### 2101 2 independent compilation units

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | + 12B    |
| J73C    | +        |
| J73I    | + 1.1    |
| PASCAL  | + 13.A.2 |
| PLI     | + 2.1    |
| CS4     | + 2.1    |
| J3      | + 2487   |

### 2102 3 compile-time module integration

|         |       |
|---------|-------|
| CHOL    | +     |
| IRONMAN | + 12B |
| J73C    | -     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | + 2.1 |
| J3      | -     |

## Program Development Aids

### 2103 2 main program

|         |         |
|---------|---------|
| CHOL    | o       |
| IRONMAN | o       |
| J73C    | +       |
| J73I    | + 1.6.2 |
| PASCAL  | + 13    |
| PLI     | + 3.2   |
| CS4     | ? 2.1   |
| J3      | + 2487  |

### 2104 3 with parameters

|         |        |
|---------|--------|
| CHOL    | o      |
| IRONMAN | o      |
| J73C    | o      |
| J73I    | -      |
| PASCAL  | + 13   |
| PLI     | + 3.2  |
| CS4     | - 2.1  |
| J3      | - 2487 |

### 2105 2 conditional compilation...

|         |       |
|---------|-------|
| CHOL    | +     |
| IRONMAN | o     |
| J73C    | +     |
| J73I    | +     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | - 7.1 |
| J3      | -     |

### 2106 3 of executable statements

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | + 6C, 11D |
| J73C    | +         |
| J73I    | + 6.1.2   |
| PASCAL  | -         |
| PLI     | -         |
| CS4     | -         |
| J3      | -         |

### 2107 3 of declarations

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | ? 6C, 1E |
| J73C    | +        |
| J73I    | + 6.1.2  |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | -        |
| J3      | -        |

## Program Development Aids

2108 3 of macros

|         |              |
|---------|--------------|
| CHOL    | o            |
| IRONMAN | ? 6C, 5G, 1E |
| J73C    | +            |
| J73I    | + 6.1.2      |
| PASCAL  | -            |
| PLI     | -            |
| CS4     | -            |
| J3      | -            |

2109 3 done by normal control clauses with compile-time conditions (indices)

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | + 6C, 11D |
| J73C    | +         |
| J73I    | -         |
| PASCAL  | -         |
| PLI     | -         |
| CS4     | -         |
| J3      | -         |

2110 4 normal control clause form only

|         |                                                         |
|---------|---------------------------------------------------------|
| CHOL    | - (Since declarations are to be conditionally compiled) |
| IRONMAN | + 6C, 11D                                               |
| J73C    | - (since declarations are to be conditionally compiled) |
| J73I    | n                                                       |
| PASCAL  | n                                                       |
| PLI     | n                                                       |
| CS4     | n                                                       |
| J3      | n                                                       |

2111 3 done by special directives

|         |                          |
|---------|--------------------------|
| CHOL    | +                        |
| IRONMAN | - 6C, 11D                |
| J73C    | +                        |
| J73I    | + 6.12 (SKIP, BEGIN-END) |
| PASCAL  | -                        |
| PLI     | -                        |
| CS4     | -                        |
| J3      | -                        |

2112 3 done by compile-time statements

|         |           |
|---------|-----------|
| CHOL    | o         |
| IRONMAN | o 6C, 11D |
| J73C    | -         |
| J73I    | -         |
| PASCAL  | -         |
| PLI     | -         |
| CS4     | -         |
| J3      | -         |



## Program Development Aids

### 2113 3 done by compile-time procedures and/or macros

|         |           |
|---------|-----------|
| CHOL    | o         |
| IRONMAN | o 6C, 11D |
| J73C    | +         |
| J73I    | + 2.5     |
| PASCAL  | -         |
| PLI     | -         |
| CS4     | -         |
| J3      | -         |

### 2114 2 compile-time preprocessing/macro capability

|         |                           |
|---------|---------------------------|
| CHOL    | o                         |
| IRONMAN | + 5G                      |
| J73C    | + (DEFINE)                |
| J73I    | + 2.5 (DEFINE)            |
| PASCAL  | -                         |
| PLI     | -                         |
| CS4     | -                         |
| J3      | + 2421 (DEFINE directive) |

### 2115 3 character oriented (precedes final lexical parse)

|         |        |
|---------|--------|
| CHOL    | o      |
| IRONMAN | o [5G] |
| J73C    | +      |
| J73I    | + 2.5  |
| PASCAL  | n      |
| PLI     | n      |
| CS4     | n      |
| J3      | + 2421 |

### 2116 3 token oriented (follows final lexical parse)

|         |        |
|---------|--------|
| CHOL    | o      |
| IRONMAN | o [5G] |
| J73C    | -      |
| J73I    | -      |
| PASCAL  | n      |
| PLI     | n      |
| CS4     | n      |
| J3      | -      |

### 2117 3 compile-time statements

|         |              |
|---------|--------------|
| CHOL    | +            |
| IRONMAN | - 1E, 1A, 5G |
| J73C    | +            |
| J73I    | +            |
| PASCAL  | -            |
| PLI     | -            |
| CS4     | -            |
| J3      | +            |

# Program Development Aids

2118 4    declaration  
          CHOL        o  
          IRONMAN    n \* [1E, 1A, 5G]  
          J73C        +  
          J73I        + 2.5.1, 2.5.2  
          PASCAL      n  
          PLI         n  
          CS4         n  
          J3          + 2421.1-.3

2119 4    assignment  
          CHOL        -  
          IRONMAN    n \* [1E, 1A, 5G]  
          J73C        -  
          J73I        - 2.5  
          PASCAL      n  
          PLI         n  
          CS4         n  
          J3          + 2421.4

2120 4    conditional  
          CHOL        o  
          IRONMAN    n \* [1E, 1A, 5G]  
          J73C        -  
          J73I        -  
          PASCAL      n  
          PLI         n  
          CS4         n  
          J3          -

2121 4    loop  
          CHOL        -  
          IRONMAN    n \* [1E, 1A, 5G]  
          J73C        -  
          J73I        -  
          PASCAL      n  
          PLI         n  
          CS4         n  
          J3          -

2122 4    go to  
          CHOL        -  
          IRONMAN    n \* [1E, 1A, 5G]  
          J73C        -  
          J73I        -  
          PASCAL      n  
          PLI         n  
          CS4         n  
          J3          -

## Program Development Aids

- 2123 4    procedure call
- |         |                  |
|---------|------------------|
| CHOL    | -                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | +                |
| J73I    | + 2.5.4          |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | -                |
- 2124 4    compound
- |         |                  |
|---------|------------------|
| CHOL    | -                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | -                |
| J73I    | -                |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | -                |
- 2125 3    compile-time variables
- |         |                             |
|---------|-----------------------------|
| CHOL    | + (Redefinable macro names) |
| IRONMAN | - 1E, 1A, 5G                |
| J73C    | + (redefinable macro names) |
| J73I    | + 2.5.1, 2.5.2              |
| PASCAL  | -                           |
| PLI     | -                           |
| CS4     | -                           |
| J3      | + 2421.1-.3                 |
- 2126 4    global
- |         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | +                |
| J73I    | + 2.5.1, 2.5.2   |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | + 2421.4         |
- 2127 4    local to compile-time procedure/macro
- |         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | -                |
| J73I    | -                |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | -                |

## Program Development Aids

### 2128 3 compile-time types and operations

|         |              |
|---------|--------------|
| CHOL    | +            |
| IRONMAN | - 1E, 1A, 5G |
| J73C    | +            |
| J73I    | +            |
| PASCAL  | -            |
| PLI     | -            |
| CS4     | +            |
| J3      | +            |

### 2129 4 integer

|         |                         |
|---------|-------------------------|
| CHOL    | + (Constant arithmetic) |
| IRONMAN | n * [1E, 1A, 5G]        |
| J73C    | -                       |
| J73I    | -                       |
| PASCAL  | n                       |
| PLI     | n                       |
| CS4     | n                       |
| J3      | -                       |

### 2130 5 add, subtract, multiply, divide

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | n                |
| J73I    | n                |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | n                |

### 2131 5 equal, greater than, etc.

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | n                |
| J73I    | n                |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | n                |

### 2132 4 varying character string

|         |                                |
|---------|--------------------------------|
| CHOL    | + (Macros and literal strings) |
| IRONMAN | n * [1E, 1A, 5G]               |
| J73C    | + (macros and literal strings) |
| J73I    | + 2.5                          |
| PASCAL  | n                              |
| PLI     | n                              |
| CS4     | n                              |
| J3      | + 2421.1-.3                    |

# Program Development Aids

2133 5      substring, concatenation, length

|         |                       |
|---------|-----------------------|
| CHOL    | +                     |
| IRONMAN | n * [1E, 1A, 5G]      |
| J73C    | + (concatenation)     |
| J73I    | + 2.5 (concatenation) |
| PASCAL  | n                     |
| PLI     | n                     |
| CS4     | n                     |
| J3      | -                     |

2134 5      equal, greater than, etc.

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | -                |
| J73I    | -                |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | -                |

2135 4      boolean

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | -                |
| J73I    | -                |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | -                |

2136 5      and, or, not

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | n                |
| J73I    | n                |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | n                |

2137 5      equal

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | n                |
| J73I    | n                |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | n                |



# Program Development Aids

2138 4 array

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | -                |
| J73I    | -                |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | -                |

2139 5 indexing

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | n * [1E, 1A, 5G] |
| J73C    | n                |
| J73I    | n                |
| PASCAL  | n                |
| PLI     | n                |
| CS4     | n                |
| J3      | n                |

2140 3 compile-time procedures/macros

|         |           |
|---------|-----------|
| CHOL    | +         |
| IRONMAN | + 5G, 12D |
| J73C    | +         |
| J73I    | +         |
| PASCAL  | -         |
| PLI     | -         |
| CS4     | -         |
| J3      | +         |

2141 4 no parameters

|         |                                   |
|---------|-----------------------------------|
| CHOL    | -                                 |
| IRONMAN | + 5G (but 12D permits parameters) |
| J73C    | -                                 |
| J73I    | -                                 |
| PASCAL  | n                                 |
| PLI     | n                                 |
| CS4     | n                                 |
| J3      | + 2421.1-.3                       |

2142 4 fixed number of parameters

|         |                |
|---------|----------------|
| CHOL    | +              |
| IRONMAN | + 12D          |
| J73C    | +              |
| J73I    | + 2.5.1, 2.5.2 |
| PASCAL  | n              |
| PLI     | n              |
| CS4     | n              |
| J3      | -              |

## Program Development Aids

### 2143 4 indefinite number of parameters

|         |                             |
|---------|-----------------------------|
| CHOL    | -                           |
| IRONMAN | o 12D (concatenated types?) |
| J73C    | -                           |
| J73I    | -                           |
| PASCAL  | n                           |
| PLI     | n                           |
| CS4     | n                           |
| J3      | -                           |

### 2144 4 positional parameters

|         |                      |
|---------|----------------------|
| CHOL    | o (Same as language) |
| IRONMAN | o 12D                |
| J73C    | +                    |
| J73I    | + 2.5.2              |
| PASCAL  | n                    |
| PLI     | n                    |
| CS4     | n                    |
| J3      | n                    |

### 2145 4 keyword parameters

|         |                      |
|---------|----------------------|
| CHOL    | o (Same as language) |
| IRONMAN | o 12D                |
| J73C    | -                    |
| J73I    | -                    |
| PASCAL  | n                    |
| PLI     | n                    |
| CS4     | n                    |
| J3      | n                    |

### 2146 4 lists, sublists, etc. as parameters, indexing of lists

|         |       |
|---------|-------|
| CHOL    | o     |
| IRONMAN | o 12D |
| J73C    | -     |
| J73I    | -     |
| PASCAL  | n     |
| PLI     | n     |
| CS4     | n     |
| J3      | n     |

### 2147 3 compile-time type trait enquiry functions

|         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | o [5G]     |
| J73C    | +          |
| J73I    | -          |
| PASCAL  | -          |
| PLI     | -          |
| CS4     | + 3.0, 7.1 |
| J3      | -          |

## Program Development Aids

- 2148 3 compile-time facilities usable inside/outside compile-time procedures
- CHOL o (Do not have full compile time programming capability)
  - IRONMAN o [5G]
  - J73C - (do not have full compile time programming capability)
  - J73I -
  - PASCAL n
  - PLI n
  - CS4 n
  - J3 n
- 2149 3 programmer control over substitutability
- CHOL -
  - IRONMAN - 12D, 5G
  - J73C -
  - J73I - 2.5
  - PASCAL n
  - PLI n
  - CS4 n
  - J3 -
- 2150 4 activate/deactivate variables and procedures
- CHOL n \*
  - IRONMAN n \* [12D, 5G]
  - J73C n \*
  - J73I -
  - PASCAL n
  - PLI n
  - CS4 n
  - J3 - 2421.4
- 2151 4 rescan/no-rescan of substituted values
- CHOL n \*
  - IRONMAN n \* [12D, 5G]
  - J73C n \*
  - J73I -
  - PASCAL n
  - PLI n
  - CS4 n
  - J3 -
- 2152 4 stripable quotes prevent substitution for one scan
- CHOL n \*
  - IRONMAN n \* [12D, 5G]
  - J73C n \*
  - J73I -
  - PASCAL n
  - PLI n
  - CS4 n
  - J3 -

# Program Development Aids

|      |   |                                                                |                |
|------|---|----------------------------------------------------------------|----------------|
| 2153 | 5 | nestable                                                       |                |
|      |   | CHOL                                                           | n *            |
|      |   | IRONMAN                                                        | n * [12D, 5G]  |
|      |   | J73C                                                           | n              |
|      |   | J73I                                                           | n              |
|      |   | PASCAL                                                         | n              |
|      |   | PLI                                                            | n              |
|      |   | CS4                                                            | n              |
|      |   | J3                                                             | n              |
| 2154 | 3 | can generate compile-time statements, declarations, procedures |                |
|      |   | CHOL                                                           | +              |
|      |   | IRONMAN                                                        | + 12D          |
|      |   | J73C                                                           | +              |
|      |   | J73I                                                           | ?              |
|      |   | PASCAL                                                         | -              |
|      |   | PLI                                                            | -              |
|      |   | CS4                                                            | -              |
|      |   | J3                                                             | + 2421         |
| 2155 | 3 | can issue error messages with severity levels                  |                |
|      |   | CHOL                                                           | o              |
|      |   | IRONMAN                                                        | o [5G]         |
|      |   | J73C                                                           | -              |
|      |   | J73I                                                           | -              |
|      |   | PASCAL                                                         | -              |
|      |   | PLI                                                            | -              |
|      |   | CS4                                                            | -              |
|      |   | J3                                                             | -              |
| 2156 | 3 | compile-time facilities are similar to run-time language       |                |
|      |   | CHOL                                                           | +              |
|      |   | IRONMAN                                                        | + 12D          |
|      |   | J73C                                                           | -              |
|      |   | J73I                                                           | -              |
|      |   | PASCAL                                                         | n              |
|      |   | PLI                                                            | n              |
|      |   | CS4                                                            | n              |
|      |   | J3                                                             | -              |
| 2157 | 2 | copy/include capability                                        |                |
|      |   | CHOL                                                           | +              |
|      |   | IRONMAN                                                        | o 12A, 12B, 5G |
|      |   | J73C                                                           | +              |
|      |   | J73I                                                           | + 6.1.1        |
|      |   | PASCAL                                                         | -              |
|      |   | PLI                                                            | + 2.7          |
|      |   | CS4                                                            | -              |
|      |   | J3                                                             | -              |

## Program Development Aids

### 2158 2 extension facilities

|         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | + 3-5A, 3C |
| J73C    | +          |
| J73I    | -          |
| PASCAL  | +          |
| PLI     | -          |
| CS4     | + 6        |
| J3      | -          |

### 2159 3 data type token declarations

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | + 3-5A  |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | + 6, 10 |
| PLI     | -       |
| CS4     | + 6.1   |
| J3      | -       |

### 2160 4 type token is lexically distinguishable from variable identifiers

|         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | o [3-5A] |
| J73C    | o        |
| J73I    | n        |
| PASCAL  | - 6      |
| PLI     | n        |
| CS4     | - 6.1    |
| J3      | n        |

### 2161 3 define data types

|         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | + 3C, 3-5A |
| J73C    | +          |
| J73I    | -          |
| PASCAL  | + 6        |
| PLI     | -          |
| CS4     | + 6.1      |
| J3      | -          |

### 2162 4 redefine primitive types

|         |         |
|---------|---------|
| CHOL    | -       |
| IRONMAN | + 2F    |
| J73C    | -       |
| J73I    | -       |
| PASCAL  | + 6.1.2 |
| PLI     | -       |
| CS4     | - E     |
| J3      | -       |



# Program Development Aids

## 2163 4 representation and operations not grouped

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | - 3-5A  |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | + 6, 10 |
| PLI     | -       |
| CS4     | -       |
| J3      | -       |

## 2164 4 representation and operations grouped (clusters, classes)

|         |        |
|---------|--------|
| CHOL    | +      |
| IRONMAN | + 3-5A |
| J73C    | +      |
| J73I    | -      |
| PASCAL  | -      |
| PLI     | -      |
| CS4     | + 6.1  |
| J3      | -      |

## 2165 5 user access to (individual) operations is...

|         |   |
|---------|---|
| CHOL    | o |
| IRONMAN | . |
| J73C    | o |
| J73I    | n |
| PASCAL  | n |
| PLI     | n |
| J3      | n |

## 2166 6 unrestricted

|         |        |
|---------|--------|
| CHOL    | -      |
| IRONMAN | - 3-5B |
| J73C    | -      |
| J73I    | n      |
| PASCAL  | n      |
| PLI     | n      |
| CS4     | -      |
| J3      | n      |

## 2167 6 programmer specifiable

|         |              |
|---------|--------------|
| CHOL    | +            |
| IRONMAN | + 3-5B       |
| J73C    | +            |
| J73I    | n            |
| PASCAL  | n            |
| PLI     | n            |
| CS4     | + 6.1, 6.1.2 |
| J3      | n            |

# Program Development Aids

2168 5 initialization code is...

|         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | o [3-5A] |
| J73C    | o        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| J3      | n        |

2169 6 block body

|         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | o [3-5A] |
| J73C    | o        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | -        |
| J3      | n        |

2170 6 procedure

|         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | o [3-5A] |
| J73C    | o        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | + 6.1.3  |
| J3      | n        |

2171 5 user access to (components of) representation is...

|         |   |
|---------|---|
| CHOL    | o |
| IRONMAN | . |
| J73C    | o |
| J73I    | n |
| PASCAL  | n |
| PLI     | n |
| J3      | n |

2172 6 unrestricted

|         |        |
|---------|--------|
| CHOL    | -      |
| IRONMAN | - 3-5B |
| J73C    | -      |
| J73I    | n      |
| PASCAL  | n      |
| PLI     | n      |
| CS4     | -      |
| J3      | n      |

# Program Development Aids

|        |            |              |
|--------|------------|--------------|
| 2173 7 | read       |              |
|        | CHOL       | n *          |
|        | IRONMAN    | n            |
|        | J73C       | n            |
|        | J73I       | n            |
|        | PASCAL     | n            |
|        | PLI        | n            |
|        | CS4        | n            |
|        | J3         | n            |
| 2174 7 | write      |              |
|        | CHOL       | n *          |
|        | IRONMAN    | n            |
|        | J73C       | n            |
|        | J73I       | n            |
|        | PASCAL     | n            |
|        | PLI        | n            |
|        | CS4        | n            |
|        | J3         | n            |
| 2175 6 | programmer | specifiable  |
|        | CHOL       | +            |
|        | IRONMAN    | + 3-5B       |
|        | J73C       | +            |
|        | J73I       | n            |
|        | PASCAL     | n            |
|        | PLI        | n            |
|        | CS4        | - 6.1, 6.1.2 |
|        | J3         | n            |
| 2176 7 | read       |              |
|        | CHOL       | +            |
|        | IRONMAN    | o [3-5B]     |
|        | J73C       | +            |
|        | J73I       | n            |
|        | PASCAL     | n            |
|        | PLI        | n            |
|        | CS4        | n            |
|        | J3         | n            |
| 2177 7 | write      |              |
|        | CHOL       | +            |
|        | IRONMAN    | o [3-5B]     |
|        | J73C       | +            |
|        | J73I       | n            |
|        | PASCAL     | n            |
|        | PLI        | n            |
|        | CS4        | n            |
|        | J3         | n            |

# Program Development Aids

2178 5 essentially same cluster facilities for defining...

|         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | o [3-5A] |
| J73C    | o        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| J3      | n        |

2179 6 classes

|         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | o [3-5A] |
| J73C    | o        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | + 6.1    |
| J3      | n        |

2180 6 monitors

|         |          |
|---------|----------|
| CHOL    | +        |
| IRONMAN | o [3-5A] |
| J73C    | +        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | -        |
| J3      | n        |

2181 6 parallel processes

|         |          |
|---------|----------|
| CHOL    | o        |
| IRONMAN | o [3-5A] |
| J73C    | o        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | -        |
| J3      | n        |

2182 6 coroutines

|         |          |
|---------|----------|
| CHOL    | -        |
| IRONMAN | o [3-5A] |
| J73C    | -        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | -        |
| J3      | n        |

## Program Development Aids

- 2183 5      can define type specific operations
- |         |        |
|---------|--------|
| CHOL    | +      |
| IRONMAN | + 3-5B |
| J73C    | +      |
| J73I    | n      |
| PASCAL  | n      |
| PLI     | n      |
| CS4     | + 6.1  |
| J3      | n      |
- 2184 6      can associate operations with operators
- |         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | + 7A |
| J73C    | -    |
| J73I    | n    |
| PASCAL  | n    |
| PLI     | n    |
| CS4     | -    |
| J3      | n    |
- 2185 4      programmer may define operations for...
- |         |        |
|---------|--------|
| CHOL    | +      |
| IRONMAN | + 3-5A |
| J73C    | +      |
| J73I    | -      |
| PASCAL  | -      |
| PLI     | -      |
| CS4     | +      |
| J3      | -      |
- 2186 5      construction
- |         |                |
|---------|----------------|
| CHOL    | +              |
| IRONMAN | + 7A, 3-3C, 3C |
| J73C    | +              |
| J73I    | n              |
| PASCAL  | -              |
| PLI     | n              |
| CS4     | +              |
| J3      | n              |
- 2187 6      allocation
- |         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | o [7A, 3-3C, 3C] |
| J73C    | +                |
| J73I    | n                |
| PASCAL  | -                |
| PLI     | n                |
| CS4     | -                |
| J3      | n                |



# Program Development Aids

|        |                           |
|--------|---------------------------|
| 2188 6 | initialization            |
|        | CHOL +                    |
|        | IRONMAN + 5E, 3C          |
|        | J73C +                    |
|        | J73I n                    |
|        | PASCAL n                  |
|        | PLI n                     |
|        | CS4 + 6.1.3               |
|        | J3 n                      |
| 2189 5 | selection (of components) |
|        | CHOL +                    |
|        | IRONMAN + 3C              |
|        | J73C +                    |
|        | J73I n                    |
|        | PASCAL -                  |
|        | PLI n                     |
|        | CS4 - 6.1.3               |
|        | J3 n                      |
| 2190 6 | read value                |
|        | CHOL +                    |
|        | IRONMAN + 3C              |
|        | J73C +                    |
|        | J73I n                    |
|        | PASCAL -                  |
|        | PLI n                     |
|        | CS4 -                     |
|        | J3 n                      |
| 2191 6 | location value            |
|        | CHOL +                    |
|        | IRONMAN o [3C]            |
|        | J73C +                    |
|        | J73I n                    |
|        | PASCAL -                  |
|        | PLI n                     |
|        | CS4 -                     |
|        | J3 n                      |
| 2192 5 | type discrimination       |
|        | CHOL +                    |
|        | IRONMAN + 6C, 3-3H, 3C    |
|        | J73C +                    |
|        | J73I n                    |
|        | PASCAL -                  |
|        | PLI n                     |
|        | CS4 -                     |
|        | J3 n                      |

# Program Development Aids

|        |                  |
|--------|------------------|
| 2193 5 | type conversion  |
|        | CHOL +           |
|        | IRONMAN + 3-5D   |
|        | J73C +           |
|        | J73I n           |
|        | PASCAL -         |
|        | PLI n            |
|        | CS4 + 6.1.3      |
|        | J3 n             |
| 2194 5 | destruction      |
|        | CHOL +           |
|        | IRONMAN o [3-5A] |
|        | J73C +           |
|        | J73I n           |
|        | PASCAL -         |
|        | PLI n            |
|        | CS4 +            |
|        | J3 n             |
| 2195 6 | termination      |
|        | CHOL +           |
|        | IRONMAN o [3-5A] |
|        | J73C +           |
|        | J73I n           |
|        | PASCAL -         |
|        | PLI n            |
|        | CS4 + 6.1.3      |
|        | J3 n             |
| 2196 6 | deallocation     |
|        | CHOL +           |
|        | IRONMAN + 3C     |
|        | J73C +           |
|        | J73I n           |
|        | PASCAL -         |
|        | PLI n            |
|        | CS4 -            |
|        | J3 n             |
| 2197 5 | equality testing |
|        | CHOL +           |
|        | IRONMAN + 7A, 3C |
|        | J73C +           |
|        | J73I n           |
|        | PASCAL -         |
|        | PLI n            |
|        | CS4 + 6.1.3      |
|        | J3 n             |

# Program Development Aids

|      |   |                         |              |
|------|---|-------------------------|--------------|
| 2198 | 5 | assignment              |              |
|      |   | CHOL                    | +            |
|      |   | IRONMAN                 | + 7A, 3C     |
|      |   | J73C                    | +            |
|      |   | J73I                    | n            |
|      |   | PASCAL                  | -            |
|      |   | PLI                     | n            |
|      |   | CS4                     | + 6.1.3      |
|      |   | J3                      | n            |
| 2199 | 5 | input                   |              |
|      |   | CHOL                    | -            |
|      |   | IRONMAN                 | o [3-5A]     |
|      |   | J73C                    | -            |
|      |   | J73I                    | n            |
|      |   | PASCAL                  | -            |
|      |   | PLI                     | n            |
|      |   | CS4                     | + 6.1.3      |
|      |   | J3                      | n            |
| 2200 | 5 | output                  |              |
|      |   | CHOL                    | -            |
|      |   | IRONMAN                 | o [3-5A]     |
|      |   | J73C                    | -            |
|      |   | J73I                    | n            |
|      |   | PASCAL                  | -            |
|      |   | PLI                     | n            |
|      |   | CS4                     | + 6.1.3      |
|      |   | J3                      | n            |
| 2201 | 5 | access to entire object |              |
|      |   | CHOL                    | +            |
|      |   | IRONMAN                 | + 3-3F, 3C   |
|      |   | J73C                    | +            |
|      |   | J73I                    | n            |
|      |   | PASCAL                  | -            |
|      |   | PLI                     | n            |
|      |   | CS4                     | -            |
|      |   | J3                      | n            |
| 2202 | 6 | read value              |              |
|      |   | CHOL                    | +            |
|      |   | IRONMAN                 | o [3-3F, 3C] |
|      |   | J73C                    | +            |
|      |   | J73I                    | n            |
|      |   | PASCAL                  | -            |
|      |   | PLI                     | n            |
|      |   | CS4                     | -            |
|      |   | J3                      | n            |

# Program Development Aids

|      |   |                                              |                |
|------|---|----------------------------------------------|----------------|
| 2203 | 6 | location value                               |                |
|      |   | CHOL                                         | +              |
|      |   | IRONMAN                                      | o [3-3F, 3C]   |
|      |   | J73C                                         | +              |
|      |   | J73I                                         | n              |
|      |   | PASCAL                                       | -              |
|      |   | PLI                                          | n              |
|      |   | CS4                                          | -              |
|      |   | J3                                           | n              |
| 2204 | 4 | operations specified as procedures/functions |                |
|      |   | CHOL                                         | +              |
|      |   | IRONMAN                                      | + 3-5A, 7A, 7D |
|      |   | J73C                                         | +              |
|      |   | J73I                                         | n              |
|      |   | PASCAL                                       | n              |
|      |   | PLI                                          | n              |
|      |   | CS4                                          | + 6.1.3, 6.1   |
|      |   | J3                                           | n              |
| 2205 | 4 | may be parameterized with...                 |                |
|      |   | CHOL                                         | +              |
|      |   | IRONMAN                                      | .              |
|      |   | J73C                                         | +              |
|      |   | J73I                                         | n              |
|      |   | PASCAL                                       | -              |
|      |   | PLI                                          | n              |
|      |   | CS4                                          | +              |
|      |   | J3                                           | n              |
| 2206 | 5 | ordinary data                                |                |
|      |   | CHOL                                         | +              |
|      |   | IRONMAN                                      | + 12D          |
|      |   | J73C                                         | +              |
|      |   | J73I                                         | n              |
|      |   | PASCAL                                       | -              |
|      |   | PLI                                          | n              |
|      |   | CS4                                          | + 6.1.1        |
|      |   | J3                                           | n              |
| 2207 | 5 | types                                        |                |
|      |   | CHOL                                         | +              |
|      |   | IRONMAN                                      | + 12D          |
|      |   | J73C                                         | +              |
|      |   | J73I                                         | n              |
|      |   | PASCAL                                       | -              |
|      |   | PLI                                          | n              |
|      |   | CS4                                          | + 6.1.1        |
|      |   | J3                                           | n              |

# Program Development Aids

2208 4 types may be concatenated

|         |       |
|---------|-------|
| CHOL    | -     |
| IRONMAN | ? 12D |
| J73C    | -     |
| J73I    | n     |
| PASCAL  | -     |
| PLI     | n     |
| CS4     | -     |
| J3      | n     |

2209 5 virtual declarations for attribute redefinition, inner accessibility

|         |       |
|---------|-------|
| CHOL    | n *   |
| IRONMAN | ? 12D |
| J73C    | n *   |
| J73I    | n     |
| PASCAL  | n     |
| PLI     | n     |
| CS4     | n     |
| J3      | n     |

2210 3 type equivalence based on...

|         |   |
|---------|---|
| CHOL    | o |
| IRONMAN | . |
| J73C    | o |
| J73I    | n |
| PLI     | n |
| J3      | n |

2211 4 type's name

|         |                                               |
|---------|-----------------------------------------------|
| CHOL    | +                                             |
| IRONMAN | + 7G, 3-3F, 3B, 5G (otherwise no need for 5G) |
| J73C    | +                                             |
| J73I    | n                                             |
| PASCAL  | ? 6 (probably)                                |
| PLI     | n                                             |
| CS4     | + 6.1                                         |
| J3      | n                                             |

2212 4 type's representation

|         |                    |
|---------|--------------------|
| CHOL    | -                  |
| IRONMAN | - 7G, 3-3F, 3B, 5G |
| J73C    | -                  |
| J73I    | n                  |
| PASCAL  | ? (probably not))  |
| PLI     | n                  |
| CS4     | -                  |
| J3      | n                  |



## Program Development Aids

2213 3    define operators

|         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | + 7A |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |

2214 4    redefine primitive operators

|         |      |
|---------|------|
| CHOL    | n *  |
| IRONMAN | + 7A |
| J73C    | n *  |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |

2215 5    for primitive types

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | + 7A, 2F |
| J73C    | n *      |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | -        |
| J3      | -        |

2216 5    for non-primitive types

|         |      |
|---------|------|
| CHOL    | n *  |
| IRONMAN | + 7A |
| J73C    | n *  |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |

2217 4    programmer can define...

|         |     |
|---------|-----|
| CHOL    | n * |
| IRONMAN | .   |
| J73C    | n * |
| J73I    | -   |
| PASCAL  | -   |
| PLI     | -   |
| CS4     | -   |
| J3      | -   |

# Program Development Aids

|      |   |                        |                |
|------|---|------------------------|----------------|
| 2218 | 5 | precedence             |                |
|      |   | CHOL                   | n *            |
|      |   | IRONMAN                | - 2C, 4F       |
|      |   | J73C                   | n *            |
|      |   | J73I                   | -              |
|      |   | PASCAL                 | -              |
|      |   | PLI                    | -              |
|      |   | CS4                    | -              |
|      |   | J3                     | -              |
| 2219 | 5 | associativity          |                |
|      |   | CHOL                   | n *            |
|      |   | IRONMAN                | + 7D           |
|      |   | J73C                   | n *            |
|      |   | J73I                   | -              |
|      |   | PASCAL                 | -              |
|      |   | PLI                    | -              |
|      |   | CS4                    | -              |
|      |   | J3                     | -              |
| 2220 | 4 | generic operators      |                |
|      |   | CHOL                   | +              |
|      |   | IRONMAN                | + 12D, 7A      |
|      |   | J73C                   | +              |
|      |   | J73I                   | +              |
|      |   | PASCAL                 | +              |
|      |   | PLI                    | +              |
|      |   | CS4                    | +              |
|      |   | J3                     | +              |
| 2221 | 5 | builtin operators only |                |
|      |   | CHOL                   | +              |
|      |   | IRONMAN                | + 7A, 2C, 4A   |
|      |   | J73C                   | +              |
|      |   | J73I                   | + 4.8, 4.6     |
|      |   | PASCAL                 | + 8.1          |
|      |   | PLI                    | + 7.1.2, 7.1.3 |
|      |   | CS4                    | + 3.2.4        |
|      |   | J3                     | + 2434-5, 2437 |
| 2222 | 5 | programmer specifiable |                |
|      |   | CHOL                   | -              |
|      |   | IRONMAN                | - 2C, 4A       |
|      |   | J73C                   | -              |
|      |   | J73I                   | -              |
|      |   | PASCAL                 | -              |
|      |   | PLI                    | -              |
|      |   | CS4                    | -              |
|      |   | J3                     | -              |

## Program Development Aids

2223 5 discriminated on all operands but not result

|         |                |
|---------|----------------|
| CHOL    | +              |
| IRONMAN | + 5C           |
| J73C    | +              |
| J73I    | + 4.8, 4.6     |
| PASCAL  | + 8.1          |
| PLI     | + 7.1.2, 7.1.3 |
| CS4     | + 3.2.4        |
| J3      | + 2434-5, 2437 |

2224 4 operation specified as a procedure/function

|         |      |
|---------|------|
| CHOL    | n    |
| IRONMAN | + 7A |
| J73C    | n    |
| J73I    | n    |
| PASCAL  | n    |
| PLI     | n    |
| CS4     | n    |
| J3      | n    |

2225 4 can define new operator tokens

|         |          |
|---------|----------|
| CHOL    | n *      |
| IRONMAN | - 4A, 2B |
| J73C    | n *      |
| J73I    | -        |
| PASCAL  | -        |
| PLI     | -        |
| CS4     | -        |
| J3      | -        |

2226 5 token is lexically distinguishable from variable identifiers

|         |          |
|---------|----------|
| CHOL    | n        |
| IRONMAN | + 4A, 2B |
| J73C    | n        |
| J73I    | n        |
| PASCAL  | n        |
| PLI     | n        |
| CS4     | n        |
| J3      | n        |

2227 3 generic procedures/functions

|         |       |
|---------|-------|
| CHOL    | +     |
| IRONMAN | + 12D |
| J73C    | +     |
| J73I    | +     |
| PASCAL  | +     |
| PLI     | +     |
| CS4     | +     |
| J3      | +     |

## Program Development Aids

- 2228 4    builtin procedures only
- CHOL       -
  - IRONMAN    - 12D
  - J73C       -
  - J73I       + 4.10.3
  - PASCAL     + 10.1, 11.1
  - PLI        -
  - CS4        +
  - J3         + 2425-30
- 2229 4    programmer specifiable
- CHOL       +
  - IRONMAN    + 12D
  - J73C       +
  - J73I       -
  - PASCAL     -
  - PLI        + 5.4.24, 6.9
  - CS4        -
  - J3         -
- 2230 4    discriminated on a single implicit argument
- CHOL       -
  - IRONMAN    - 5D
  - J73C       -
  - J73I       -
  - PASCAL     -
  - PLI        -
  - CS4        -
  - J3         -
- 2231 4    discriminated on all explicit arguments
- CHOL       +
  - IRONMAN    + 12D, 5D
  - J73C       +
  - J73I       + 4.10.3
  - PASCAL     + 10.1, 11.1
  - PLI        + 5.4.24, 6.9
  - CS4        +
  - J3         + 2425-30
- 2232 3    define syntax
- CHOL       -
  - IRONMAN    - 2C
  - J73C       -
  - J73I       -
  - PASCAL     -
  - PLI        -
  - CS4        -
  - J3         -

## Program Development Aids

### 2233 2 extensive list processing facilities

|         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | - 1A |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |

### 2234 2 extensive simulation facilities

|         |      |
|---------|------|
| CHOL    | -    |
| IRONMAN | - 1A |
| J73C    | -    |
| J73I    | -    |
| PASCAL  | -    |
| PLI     | -    |
| CS4     | -    |
| J3      | -    |

### 2235 2 ASSERT statement

|         |       |
|---------|-------|
| CHOL    | o     |
| IRONMAN | + 10F |
| J73C    | o     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | -     |
| J3      | -     |

### 2236 3 ASSUME statement also

|         |         |
|---------|---------|
| CHOL    | o       |
| IRONMAN | o [10F] |
| J73C    | o       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | -       |
| J3      | -       |

### 2237 2 can authorize or prohibit use of certain language features

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | o       |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | + 7.2.2 |
| J3      | -       |



## Program Development Aids

### 2238 3 go to statements

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | o       |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | + 7.2.2 |
| J3      | -       |

### 2239 3 disabling of run-time checks

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | o       |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | + 7.2.2 |
| J3      | -       |

### 2240 3 machine specific data types

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | o       |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | + 7.2.2 |
| J3      | -       |

### 2241 3 unsafe access to representation, overlays

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | o       |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | + 7.2.2 |
| J3      | -       |

### 2242 3 assembly language

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | o       |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | + 7.2.2 |
| J3      | -       |

## Program Development Aids

### 2243 3 non-portable features

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | o       |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | + 7.2.2 |
| J3      | -       |

### 2244 2 specifiable optimization attributes

|         |            |
|---------|------------|
| CHOL    | +          |
| IRONMAN | + 11F      |
| J73C    | +          |
| J73I    | + 6.4, 6.5 |
| PASCAL  | -          |
| PLI     | + 5.4.46   |
| CS4     | + 5.1.2    |
| J3      | -          |

### 2245 2 machine-dependent parameters environment enquiries

|         |                  |
|---------|------------------|
| CHOL    | +                |
| IRONMAN | + 11C, 11D, 3-1D |
| J73C    | +                |
| J73I    | + 1.2            |
| PASCAL  | -                |
| PLI     | -                |
| CS4     | -                |
| J3      | -                |

### 2246 3 word length

|         |                    |
|---------|--------------------|
| CHOL    | +                  |
| IRONMAN | o [11C, 11D, 3-1D] |
| J73C    | +                  |
| J73I    | + 1.2              |
| PASCAL  | -                  |
| PLI     | -                  |
| CS4     | -                  |
| J3      | -                  |

### 2247 3 model

|         |       |
|---------|-------|
| CHOL    | +     |
| IRONMAN | + 11C |
| J73C    | +     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | -     |
| J3      | -     |

## Program Development Aids

### 2248 3 memory size

|         |       |
|---------|-------|
| CHOL    | +     |
| IRONMAN | + 11C |
| J73C    | +     |
| J73I    | + 1.2 |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | -     |
| J3      | -     |

### 2249 3 hardware options

|         |       |
|---------|-------|
| CHOL    | +     |
| IRONMAN | + 11C |
| J73C    | +     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | -     |
| J3      | -     |

### 2250 3 operating system

|         |       |
|---------|-------|
| CHOL    | +     |
| IRONMAN | + 11C |
| J73C    | +     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | -     |
| J3      | -     |

### 2251 3 peripheral equipment

|         |       |
|---------|-------|
| CHOL    | +     |
| IRONMAN | + 11C |
| J73C    | +     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | -     |
| J3      | -     |

### 2252 2 assembly language...

|         |       |
|---------|-------|
| CHOL    | +     |
| IRONMAN | + 11E |
| J73C    | +     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | +     |
| J3      | +     |

## Program Development Aids

### 2253 3 direct code

|         |        |
|---------|--------|
| CHOL    | -      |
| IRONMAN | - 11E  |
| J73C    | -      |
| J73I    | -      |
| PASCAL  | -      |
| PLI     | -      |
| CS4     | -      |
| J3      | + 2452 |

### 2254 3 inline subroutines

|         |         |
|---------|---------|
| CHOL    | +       |
| IRONMAN | o [11E] |
| J73C    | +       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | + 8.2   |
| J3      | -       |

### 2255 2 cross-reference listing

|         |                      |
|---------|----------------------|
| CHOL    | +                    |
| IRONMAN | + 13G                |
| J73C    | +                    |
| J73I    | -                    |
| PASCAL  | -                    |
| PLI     | -                    |
| CS4     | -                    |
| J3      | + 3.2.11.2, 3.2.11.7 |

### 2256 3 set/used listing

|         |                      |
|---------|----------------------|
| CHOL    | +                    |
| IRONMAN | o [13G]              |
| J73C    | +                    |
| J73I    | -                    |
| PASCAL  | -                    |
| PLI     | -                    |
| CS4     | -                    |
| J3      | + 3.2.11.2, 3.2.11.7 |

### 2257 2 integrated loader and debugging system

|         |       |
|---------|-------|
| CHOL    | +     |
| IRONMAN | + 13G |
| J73C    | +     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | -     |
| J3      | -     |

# Program Development Aids

## 2258 2 program control of program overlays (dynamic linking)

|         |                  |
|---------|------------------|
| CHOL    | - (by extension) |
| IRONMAN | + 8E             |
| J73C    | - (by extension) |
| J73I    | -                |
| PASCAL  | -                |
| PLI     | + 3.2 (partly)   |
| CS4     | -                |
| J3      | -                |

## 2259 2 translator dependent limits specified...

|         |         |
|---------|---------|
| CHOL    | o       |
| IRONMAN | + 13F   |
| J73C    | o       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | -       |
| J3      | - 3.2.9 |

## 2260 3 number of identifiers

|         |       |
|---------|-------|
| CHOL    | o     |
| IRONMAN | + 13F |
| J73C    | o     |
| J73I    | -     |
| PASCAL  | -     |
| PLI     | -     |
| CS4     | -     |
| J3      | -     |

## 2261 3 number of statements

|         |         |
|---------|---------|
| CHOL    | o       |
| IRONMAN | o [13F] |
| J73C    | o       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | -       |
| J3      | -       |

## 2262 3 length of statements

|         |         |
|---------|---------|
| CHOL    | o       |
| IRONMAN | o [13F] |
| J73C    | o       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | -       |
| J3      | -       |



## Program Development Aids

2263 3   nesting limits

|         |         |
|---------|---------|
| CHOL    | o       |
| IRONMAN | o [13F] |
| J73C    | o       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | -       |
| J3      | -       |

2264 4   loops

|         |         |
|---------|---------|
| CHOL    | o       |
| IRONMAN | o [13F] |
| J73C    | o       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | -       |
| J3      | -       |

2265 4   blocks

|         |         |
|---------|---------|
| CHOL    | o       |
| IRONMAN | o [13F] |
| J73C    | o       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | -       |
| J3      | -       |

2266 4   subroutines

|         |         |
|---------|---------|
| CHOL    | o       |
| IRONMAN | o [13F] |
| J73C    | o       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | -       |
| J3      | -       |

2267 4   parenthesis levels

|         |         |
|---------|---------|
| CHOL    | o       |
| IRONMAN | o [13F] |
| J73C    | o       |
| J73I    | -       |
| PASCAL  | -       |
| PLI     | -       |
| CS4     | -       |
| J3      | -       |